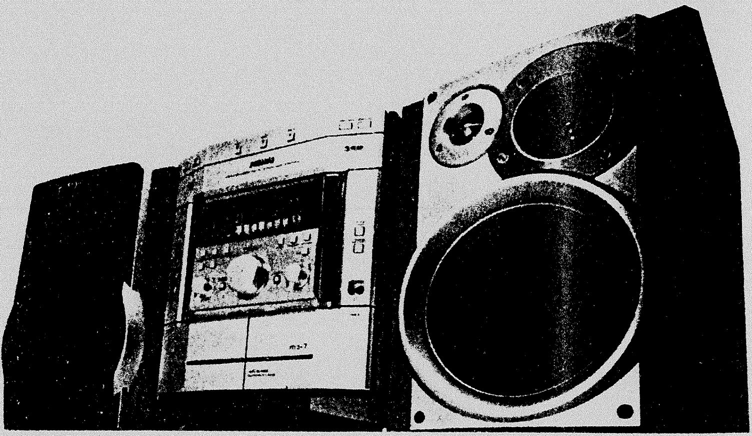
Mini System **MZ7/22/37**

Service
Service
Service



Service Manual

ReWritable CD COMPATIBLE
COMPACT disc DIGITAL AUDIO

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CLASS 1
LASER PRODUCT

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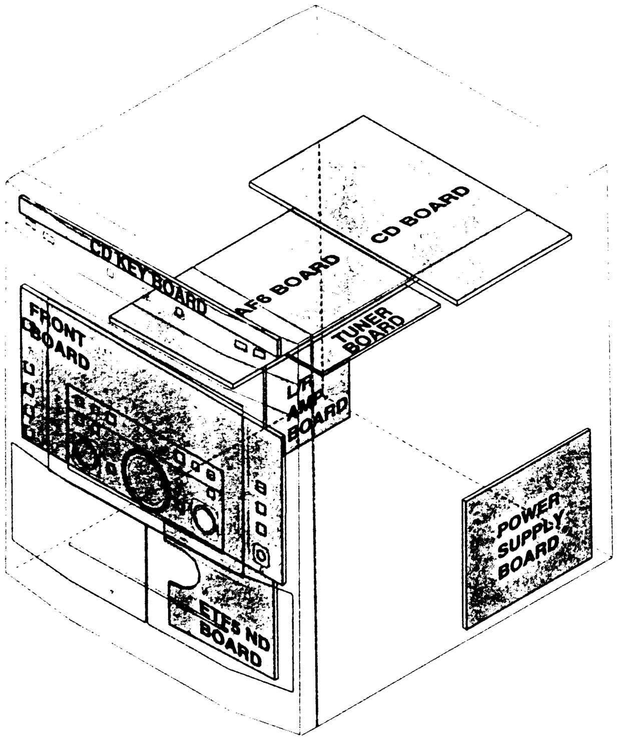
PCS 102 799

PHILIPS

LOCATION OF PRINTED CIRCUIT BOARDS



VERSION VARIATIONS:

Type /Versions:	MZ7							
Features & Board in used:	/22	/37						
Aux In	x	x						
Line Out	x	x						
Surround Out								
Subwoofer Out	x	x						
Digital Out	x	x						
Matrix Surround								
CD Text								
Dolby B								
RDS	x							
News	x							
Incredible Surround	x	x						
Karaoke Features								
Voltage Selector								
Low Power Standby / LED								
Tuner board - ECO5 Sys		x						
Tuner board - Tuner 95	x							
Surround Loudspeakers								

SPECIFICATIONS

GENERAL:

Mains voltage : 100V for /26
110-127V/220-240V Switchable for /21/21M
120V for /37
220V for /33
220-230V for /22/34
230V for /25
230-240V for /30
Mains frequency : 50/60Hz
Power consumption : < 15W at Standby
< 75W at 1/8 rated power out
Clock accuracy : < 4 seconds per day
Dimension centre unit : 265 x 310 x 390mm

TUNER:

FM

Tuning range : 87.5-108MHz
65.81-74MHz for /34
Grid : 50kHz (& 30kHz for /34)
IF frequency : 10.7MHz ± 25kHz
Aerial input : 75ohm coaxial
300ohm click fit for /37
Sensitivity at 26dB S/N : < 7µV
Selectivity at 600kHz bandwidth : > 50dB
Image rejection : > 25dB [> 75dB]
Distortion at RF=1mV, dev. 75kHz : < 3% [< 2%]
-3dB Limiting point : < 7µV
Crosstalk at RF=1mV, dev. 40kHz : > 18dB [> 26dB]

MW

Tuning range : 531-1602kHz
530-1700kHz for /21/21M/37
Grid : 9kHz
10kHz for /21/21M/37
IF frequency : 450kHz ± 1kHz
Aerial input : Frame aerial
Sensitivity at 26dB S/N : < 4.0mV/M
Selectivity at 18kHz bandwidth : > 18dB
IF rejection : > 45dB
Image rejection : > 28dB
Distortion at RF=50mV, m=80% : < 5% [< 7%]

LW

Tuning range : 153-279kHz
Grid : 3kHz
IF frequency : 450kHz ± 1kHz
Aerial input : Frame aerial
Sensitivity at 26dB S/N : [< 7.0mV/M]
Selectivity at 18kHz bandwidth : [> 24dB]
IF rejection : [> 26dB]
Image rejection : [> 35dB]
Distortion at RF=50mV, m=80% : [< 7%]

AMPLIFIER:

Output power (6ohm, 1kHz, 10% THD)
L & R : 2 x 50W

Frequency response within -3dB : 60Hz-16kHz
Incredible Surround : ON / OFF
Bass : + / - 3 steps
Treble : + / - 3 steps
Loudness : ON / OFF

Headphone output at 32 ohm : 15mW ± 2dB

Input sensitivity
Aux in : 500mV ± 2dB at 1 kohm
Output sensitivity
Line out : 500mV ± 2dB at 22 kohm
Subwoofer out (max. vol.) : 1.5V ± 2dB at 22 kohm

CASSETTE RECORDER:

Number of track : 2 x 2 stereo
Tape speed : 4.76cm/sec -0.8/+1.8%
1.6 x 4.76 cm/sec
Wow and flutter : < 0.35% (IEC)
Fast-wind/Rewind time C60 : 130 sec
Bias system : 75kHz ± 10kHz
Rec/Pb freq. response within 4dB (IEC I) : 250Hz - 12.5kHz
Rec/Pb freq. response within 4dB (IEC II): 80Hz - 12.5kHz
Signal to noise ratio (IEC I) : > 44dB
Signal to noise ratio (IEC II) : > 47dB

COMPACT DISC:

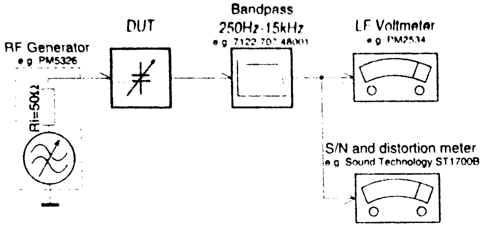
Measurement done at output conn. of the CDC module.
Frequency response within ± 1.5dB : 20Hz - 20kHz
Output level (in Vrms) : 550mV ± 1dB unloaded
Signal/Noise ratio (A-weighted) : > 80dBA
Distortion at 1kHz : < 0.5%
Channel difference at 1kHz : < 1dB
Channel crosstalk at 1kHz : > 60dB
De-emphasis : 0 or 15/50 mS (Switched by subcode on the disc)

[....] Values indicated are for "Tuner 95 Board" only

1) Frequency response in each setting is software controlled.

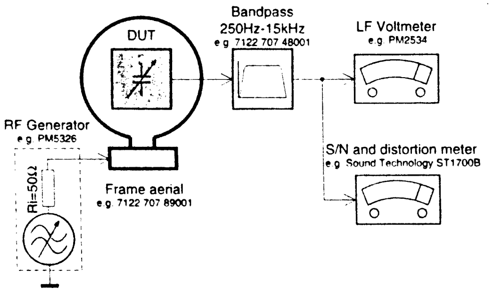
MEASUREMENT SETUP

Tuner FM


RF Generator
e.g PM5326
Ri=50Ω
DUT
Bandpass
250Hz-15kHz
e.g 7122 707 48001
LF Voltmeter
e.g PM2534
S/N and distortion meter
e.g Sound Technology ST1700B

Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilottone (19kHz, 38kHz).

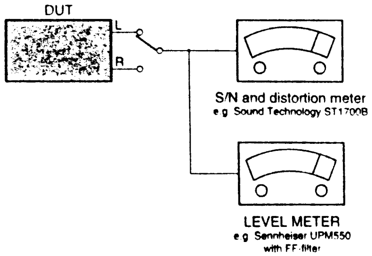
Tuner AM (MW,LW)


DUT
Bandpass
250Hz-15kHz
e.g 7122 707 48001
LF Voltmeter
e.g PM2534
RF Generator
e.g PM5326
Ri=50Ω
Frame aenal
e.g 7122 707 89001
S/N and distortion meter
e.g Sound Technology ST1700B

To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday's cage.
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

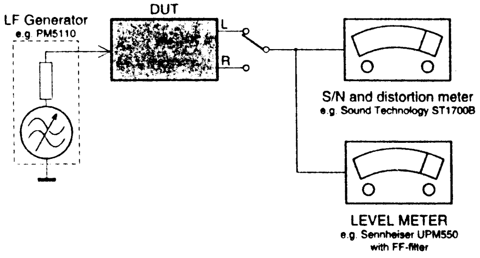
CD

Use Audio Signal Disc SBC429 4822 397 30184
(replaces test disc 3)


DUT
L
R
S/N and distortion meter
e.g Sound Technology ST1700B
LEVEL METER
e.g Sennheiser UPM550
with FF-filter

Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069
or Universal Test Cassette **Fe** SBC420 4822 397 30071


LF Generator
e.g PM5110
DUT
L
R
S/N and distortion meter
e.g Sound Technology ST1700B
LEVEL METER
e.g Sennheiser UPM550
with FF-filter

SERVICE AIDS

Service Tools:

Universal Torx driver holder	4822 395 91019
Torx bit T10 150mm	4822 395 50456
Torx driver set T6 - T20	4822 395 50145
Torx driver T10 extended	4822 395 50423

Cassette:

SBC419 Test cassette CrO2	4822 397 30069
SBC420 Test cassette Fe	4822 397 30071
MTT150 Dolby level 200nWb/M	4822 397 30271

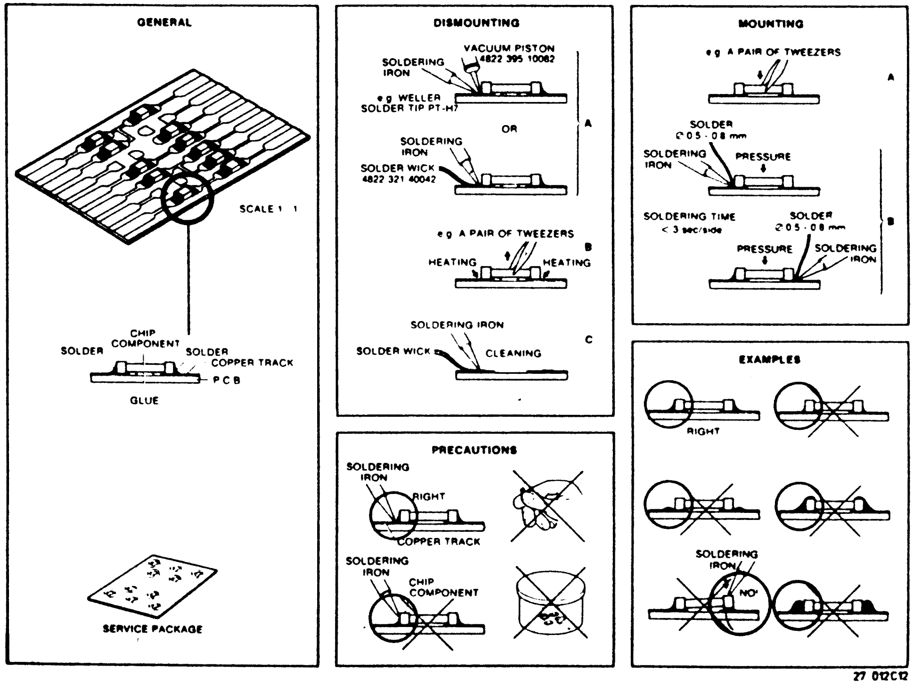
Compact Disc:

SBC426/426A Test disc 5 + 5A	4822 397 30096
SBC442 Audio Burn-in Test disc 1kHz	4822 397 30155
SBC429 Audio Signals disc	4822 397 30184
Dolby Pro-logic Test Disc	4822 395 10216

ESD Equipment:

Anti-static table mat - large 1200x650x1.25mm	4822 466 10953
Anti-static table mat - small 600x650x1.25mm	4822 466 10958
Anti-static wristband	4822 395 10223
Connector box (1MΩ)	4822 320 11307
Extension cable (to connect wristband to conn. box)	4822 320 11305
Connecting cable (to connect table mat to conn. box)	4822 320 11306
Earth cable (to connect product to mat or box)	4822 320 11308
Complete kit ESD3 (combining all above products)	4822 320 10671
Wristband tester	4822 344 13999

HANDLING CHIP COMPONENTS


GENERAL
SCALE 1 : 1
CHIP COMPONENT
SOLDER
SOLDER
COPPER TRACK
PCB
GLUE
SERVICE PACKAGE
DISMOUNTING
VACUUM PISTON
4822 395 10082
SOLDERING IRON
e.g WELLER SOLDER TIP PT-H7
OR
SOLDERING IRON
SOLDER WICK
4822 321 40042
A
e.g A PAIR OF TWEEZERS
HEATING
HEATING
B
SOLDERING IRON
SOLDER WICK
CLEANING
C
MOUNTING
e.g A PAIR OF TWEEZERS
A
SOLDER
⌀ 0.5 - 0.8 mm
SOLDERING IRON
PRESSURE
SOLDERING TIME
< 3 sec/side
SOLDER
⌀ 0.5 - 0.8 mm
PRESSURE
SOLDERING IRON
B
PRECAUTIONS
SOLDERING IRON
RIGHT
COPPER TRACK
SOLDERING IRON
CHIP COMPONENT
EXAMPLES
RIGHT
SOLDERING IRON
NO!
27 012C12

(GB) WARNING

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential

(F) ATTENTION

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux decharges statiques (ESD).
Leur longevite pourrait être considérablement écourtee par le fait qu'aucune precaution n'est prise à leur manipulation.
Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet serti d'une résistance de securité.
Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

ESD

(D) WARNUNG

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).
Unsorgfältige Behandlung im Reparaturfall kan die Lebensdauer drastisch reduzieren.
Veranlassen Sie, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand verbunden sind mit dem gleichen Potential wie die Masse des Gerätes.
Bauteile und Hilfsmittel auch auf dieses gleiche Potential halten.

(NL) WAARSCHUWING

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen.
Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

(I) AVVERTIMENTO

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevità potrebbe essere fortemente ridatta in caso di non osservazione della più grande cauzione alla loro manipolazione.
Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

(GB)

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used

(NL)

Veiligheidsbepalingen vereisen, dat het apparaat bij reparatie in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.

(F)

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utiliséés les piéces de rechange identiques à celles spécifiees.

(D)

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Original zustand des Geräts darf nicht verändert werden; fur Reparaturen sind Original-Ersatzteile zu verwenden.

(I)

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati.

"After servicing and before returning set to customer perform a leakage current measurement test from all exposed metal parts to earth ground to assure no shock hazard exist. The leakage current must not exceed 0.5mA."

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

CLASS 1
LASER PRODUCT

(GB) Warning !

Invisible laser radiation when open.
Avoid direct exposure to beam.

(S) Varning !

Osynlig laserstrålning når apparaten år öppnad och spärren är urkopplad. Betrakta ej strålen.

(SF) Varoitus !

Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen!

(DK) Advarse !

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsaettelse for stråling

General Information

- ***The typeplate (which contains the serial number) is located at the rear of the system.***
- ***Recording is permissible if copyright or other rights of third parties are not infringed.***
- ***This product complies with the radio interference requirements of the European Community.***

Environmental Information

All unnecessary packaging has been omitted. We have tried to make the packaging easy to separate into three materials: cardboard (box), polystyrene foam (buffer) and polyethylene (bags, protective foam sheet)

Your system consists of materials which can be recycled and reused if disassembled by a specialized company. Please observe the local regulations regarding the disposal of packaging materials, exhausted batteries and old equipment

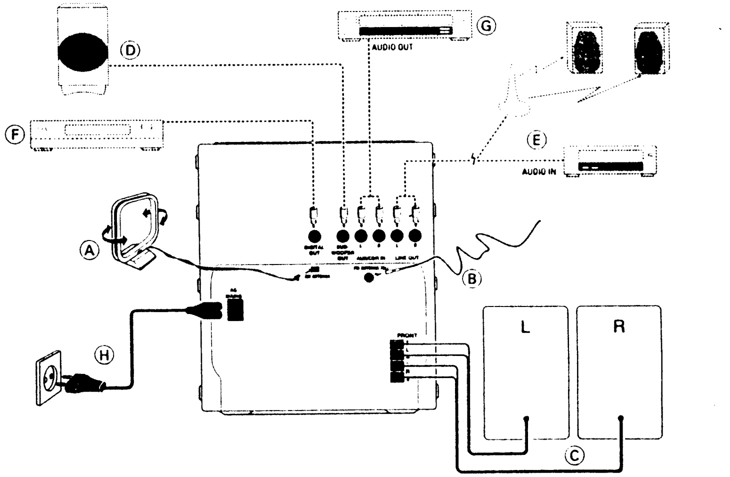
Accessories *(Supplied)*

- Remote control
- Batteries (two AA size) for remote control
- AM loop antenna
- FM wire antenna
- AC power cord

Safety Information

- Before operating the system, check that the operating voltage indicated on the typeplate (or the voltage indication beside the voltage selector) of your system is identical with the voltage of your local power supply. If not, please consult your dealer. The typeplate is located at the rear of your system
- When the system is switched on, do not move it around
- Place the system on a solid base (e.g. a cabinet).
- Place the system in a location with adequate ventilation to prevent internal heat build-up in your system
- The system incorporates a built in safety feature that prevents over heating
- Do not expose the system to excessive moisture, rain, sand or heat sources
- Under no circumstances should you repair the system yourself, as this will invalidate the warranty!
- If the system is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lens of the CD unit inside the system. Should this occur, the CD player will not operate normally. Leave the power on for about one hour with no disc in the system until normal playback is possible
- Electrostatic discharge may cause unexpected problems. See whether these problems disappear if you unplug the AC power cord and plug it in again after a few seconds.
- **To disconnect the system from the power supply completely, remove the AC power plug from the wall socket.**

Rear Connections



Ⓐ AM Loop Antenna Connection

Connect the supplied loop antenna to the AM ANTENNA terminal. Place the AM loop antenna far away from the system and adjust its position for the best reception.

Ⓑ FM Wire Antenna Connection

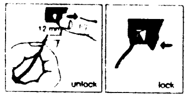
Connect the supplied FM wire antenna to the FM ANTENNA 75 Ω terminal. Adjust the position of the FM antenna for the best reception.

Outdoor Antenna

For better FM stereo reception connect an outdoor FM antenna to the FM ANTENNA 75 Ω terminal using a 75 Ω coaxial wire.

Ⓒ Speakers Connection

- Connect the right speaker to Front terminal R with the red wire to + and the black wire to –
- Connect the left speaker to Front terminal L with the red wire to + and the black wire to –
- Clip the stripped portion of the speaker wire as shown.



Ⓓ Subwoofer Out Connection

Connect the optional active subwoofer to the SUBWOOFER OUT terminal. The subwoofer reproduces just the low bass effect (e.g. explosions, the rumble of spaceships, etc.). Be sure to follow the instructions supplied with the subwoofer.

Ⓔ Line Out Connection *(wireless ready)*

You can connect the audio left and right LINE OUT terminals to a optional CD Recorder ANALOGUE IN terminals. This allows you to record in an analogue format.

You can also install additional optional front active speakers away from the system (e.g. in another room) to reduce the inconvenience of running long speaker wires across rooms. You can place as many remote speakers as you like provided they operate at the same radio frequency. Connect the wireless radio frequency transmitter to the LINE OUT terminals. Place the active speakers at your preferred location. Be sure to follow the instructions supplied with the active speakers.

Note

- *Availability of a wireless transmitter and its peripherals is subjected to the approval of local authorities. Please check with your local safety or approving authority.*

Ⓕ Digital Out Connection

You can record the digital sound from the CD, through this output, on any audio equipment with digital input (e.g. CD Recorder, Digital Audio Tape (DAT) deck, Digital to Analog Converter and Digital Signal Processor).

Connect one end of the cinch cable (not supplied) to the DIGITAL OUT socket and the other end to the audio equipment with digital input. When connecting the cinch cable, make sure it is fully inserted.

Ⓖ Connecting other equipment to your system

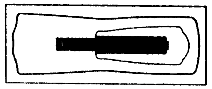
You can connect the audio left and right OUT terminals of a TV, VCR, Laser Disc player, DVD player or CD-Recorder to the AUX/CDR IN terminals at the rear of the system.

Ⓗ AC Power Supply

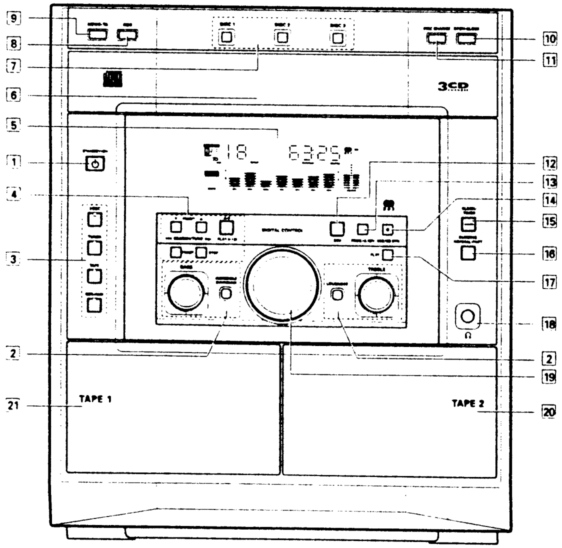
After all other connections have been made, connect the AC power cord to the system and to the wall outlet.

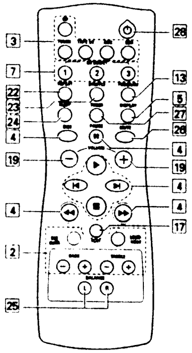
Inserting batteries into the Remote Control

- Insert the batteries (Type R06 or AA) into the remote control as shown in the battery compartment.



- To avoid damage from possible battery leakage, remove dead batteries or batteries that will not be used for a long time. For replacement, use type R06 or AA batteries.





Controls on the system and remote control

1 **STANDBY•ON**
- to switch the system on or to standby mode.
- to use for EASY SET

2 **DIGITAL CONTROL** – to select the desired digital sound effect:

INCREDIBLE SURROUND
- to switch on or off the surround sound effect.

BASS + / –
- to adjust the Bass level.

TREBLE + / –
- to adjust the Treble level.

LOUDNESS
- to switch on or off the loudness sound effect in low volume level.

3 **SOURCE** – to select the following:

3 CDC
- to select CD mode. When CD playback is stopped, press to select the disc tray 1, 2 or 3.

TUNER
- to select Tuner mode. When in Tuner mode, press to select the waveband: FM, MW or LW.

TAPE
- to select Tape mode. When tape playback is stopped, press to select either tape deck 1 or 2.

CDR / AUX
- to select sound from an external source (e.g. TV, VCR, Laser Disc player, DVD player or CD Recorder). When in Aux mode, press to select either AUX/DVD or CDRW.

4 **MODE SELECTION**

SEARCH / TUNE ⏮◀◀ ▶▶⏭
(PRESET ▼▲)

for CD	to search backward/forward
....	to skip to the beginning of the current, previous, or next track *(press the button for less than 0.5 seconds).*
for TUNER	*(if PRESET mode is OFF)* to tune to a lower or higher radio frequency
....	*(if PRESET mode is ON)* to select a preset station in memory
for TAPE	to rewind or fast forward a tape

PLAY ▶ / II (A•B)

for CD	to start or interrupt playback.
for TAPE	to start playback
....	SIDE: when playing in Tape 2 mode, to change side

PRESET
to switch on or off the PRESET mode.

STOP ■

for CD	to stop CD playback or to clear a program
for TUNER	to stop programming
for TAPE	to stop playback or recording
DEMO	*(on the system only!)* to start or stop demonstration mode

5 **DISPLAY SCREEN**
- to view the current setting of the system.

6 **CD CAROUSEL TRAY**

7 **DISC 1 / DISC 2 / DISC 3**
- to select a CD tray for playback.

8 **RDS**
- to select RDS data in the following order: station name, program type, radio text and frequency.

9 **NEWS•TA**
- to hear News or Traffic Announcement data automatically.

10 **OPEN•CLOSE**
- to open or close the CD carousel.

11 **DISC CHANGE**
- to change CD(s)

12 **DIM**
- to select 4 different DIM mode on the display screen, DIM 1, DIM 2, DIM 3 or DIM OFF
- to reset the tape counter in tape mode only *(press the button for more than 2 seconds)*

13 **PROG / A. REV (PROGRAM / AUTO REVERSE)**

for CD	to program CD tracks
for TUNER	to program preset radio stations
for TAPE	to select the desired play modes (⊐ / ⊐⊃ / (⊐)) on tape deck 2 only

14 **REC / CD SYN (RECORD / CD SYNCHRO)**
- to start recording or to synchronise the CD recording on tape deck 2.

15 **CLOCK/TIMER**
- to view the clock, set the clock or set the timer.

16 **DUBBING NORMAL•FAST**
- to dub a tape in normal or fast speed.

17 **FLAT**
- to switch on or off the digital sound control setting.

18 **🎧**
- to connect headphones.

19 **VOLUME**
- to adjust the volume.

20 **TAPE DECK 2**

21 **TAPE DECK 1**

22 **REPEAT**
- to repeat a CD track, a disc, or all the available discs.

23 **SHUFFLE**
- to play all the available discs and their tracks in random order.

24 **SLEEP**
- to switch the system to standby mode at a selected time period.

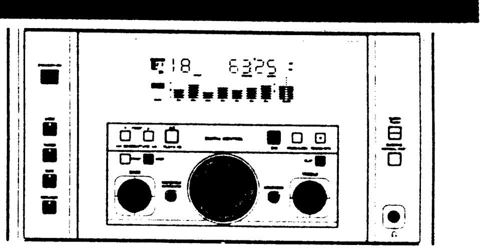
25 **BALANCE L/R**
- to balance the sound level of the Front Left and Right speakers.

26 **MUTE**
- to switch off the sound temporarily.

27 **TIMER**
- to switch on or off timer.

28 **⏻**
- to switch the system to standby mode

Notes for remote control:
- ***First select the source you wish to control by pressing one of the source select keys on the remote control (e.g. CD, TUNER, TAPE 1/2 or AUX).***
- ***Then select the desired function (▶, ⏮, ⏭, etc.).***



Important:
Before you operate the system, complete the preparation procedures.

Demonstration mode

The system has a demonstration mode that shows the various features offered by the system. ***When the system is switched on for the first time, the demonstration mode will start automatically.***

Notes:
- *During the demonstration, if you press any source (or standby-on) button, the system will switch to the respective mode (or standby).*
- *When the system is switched to standby mode, the demonstration will resume 5 seconds later.*

To stop the demonstration mode
- Press and hold **STOP** *(on the system only!)* for **5 seconds** when the system is in demonstration mode.
  → The demonstration will stop.
  → "DEMO OFF" is displayed.
  → The system will switch to standby mode.

Note:
- *Even though the AC power cord is removed from and reconnected to the wall socket, the demonstration will remain off until it is switched on again.*

To start the demonstration mode
- Press and hold **STOP** *(on the system only!)* for **5 seconds** when the system is in standby mode.
  → The demonstration will begin.

Easy Set

EASY SET allows you to store all available radio stations and RDS stations automatically

1 Press and hold **STANDBY•ON** *(on the system only)* for ***5 seconds***, when the system is in standby or demonstration mode
  - → "EASY SET" will be displayed, and followed by "TUNER" and then "AUTO"
  - → EASY SET will start searching for all radio stations with RDS and then followed by radio stations on FM, MW and LW band respectively
  - → All available RDS and radio stations with sufficient signal strength will be stored. Up to 40 presets may be stored

2 The system will proceed to set the RDS time automatically with the stored RDS preset station

- If no RDS station is available in the first preset station, the program will exit automatically
  - → After a radio station is found, "EASY SET" will be displayed and followed by "TIME"
- When searching RDS time,
  - → "SEARCH RDS TIME" will be displayed.
  - → When RDS time is read, "RDS TIME" will be displayed. The current time will be displayed for 2 seconds and stored automatically

Notes:
- *EASY SET will start with the RDS station, if there are still presets available, it will continue to store the FM, MW and LW bands respectively.*
- *When EASY SET is used, all previously stored radio stations will be replaced*
- *The last preset radio station or the first available RDS station will appear on the display when EASY SET is completed.*
- *If RDS station does not transmit RDS time within 90 seconds, the program will exit automatically and the display will show "NO RDS TIME".*

Switching the system ON

- Press **STANDBY•ON** *(on the system only)*, **3 CDC**, **TUNER**, **TAPE** or **CDR/AUX**

You can also switch on the system by pressing any one of the CD DIRECT PLAY buttons

Switching the system to standby mode

- Press **STANDBY•ON** again or ⏻ on the remote control.
  - → The system will switch to standby mode

Selecting the Source

- Press the respective source selection button: **3 CDC**, **TUNER**, **TAPE** or **CDR/AUX**.
  - → The display indicates the selected source

Note:
- *For an external source, make sure you have connected the audio left and right OUT terminals of the external equipment (TV, VCR, Laser Disc player, DVD player or CD Recorder) to the AUX/CDR IN terminals.*

Dim Mode

This feature allows you to select 4 different modes for display brightness.

- Press **DIM** to select the desired screen display brightness: DIM 1, DIM 2, DIM 3 or DIM OFF.
  - → The DIM display lights up.
  - → "DIM 1", "DIM 2", "DIM 3" or "DIM OFF" will be displayed depending on the mode selected.

Volume Adjustment

Adjust VOLUME to increase or decrease the sound level.

For Personal Listening

Connect the headphones plug to the 🎧 socket at the front of the system. The speakers will be muted.

MUTE *(on remote control only)*

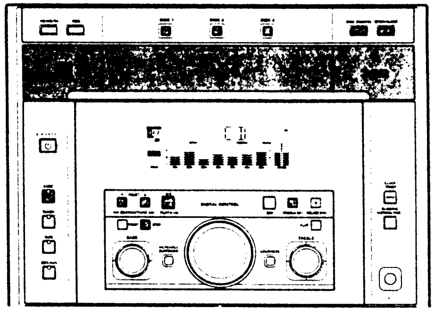
This feature allows you to temporarily switch off the sound without switching off the system when you require a moment of silence.

- Press **MUTE** on the remote control to switch off the sound.
  - → "MUTE" will be displayed.
- Press **MUTE** again on the remote control or increase the VOLUME level to switch on the sound.

BALANCE L/R *(on remote control only)*

You can adjust the sound balance of the left and right speakers.

- Press **BALANCE L/R** on the remote control to adjust the sound of the front Left or Right speaker respectively.
  - → The display will show "LEFT X", "BALANCED" or "RIGHT X".



Warning!
1) ***This system is designed for conventional CDs. Do not use any accessories such as disc stabilizer rings or CD treatment sheets, etc., which may damage the CD mechanism.***
2) ***Do not load more than one disc into each tray.***
3) ***When the CD changer is loaded with CDs, do not turn over or shake the system. This may jam the changer.***

You may load three discs in the CD changer for continuous playback without interruption.

Disc for playback

This system can playback all audio CD, finalized audio CD-Recordable and finalized audio CD-Rewritable format discs.

Loading the CD Changer

1 Press **3 CDC** to select CD mode

2 Press **OPEN•CLOSE**.
  - → The CD carousel slides out

3 Load a CD with the printed side up in the right tray

- You can load another disc in the left tray
- To load the third disc, press the **DISC CHANGE** button
  - → The CD carousel will rotate until the empty tray is ready for loading.

4 Press **OPEN•CLOSE** to close the CD carousel.
  - → The total number of tracks and the playing time of the last selected disc appear on the display

Note:
- *To ensure good system performance, wait until the CD changer completely reads the disc(s) before proceeding*

CD Direct Play

You can play a CD directly by pressing the **DISC 1**, **DISC 2** or **DISC 3** button. The CD player will stop at the end of playback of the selected disc.

- A lit button indicates that a disc is loaded in the disc tray

Playing a CD

1 Press **PLAY** ▶ to start playback
  - → The disc tray, track number and elapsed playing time of the current track appear on the display

- To interrupt playback, press **II**
  - → The playing time flashes
- To resume playback, press **PLAY** ▶ again

2 To stop playback, press **STOP**.

Note:
- *All the available discs will play once, then stop*

Disc Change

You can change the outer two discs while the third inner disc is stopped or is playing

1 Press **DISC CHANGE**
  - → The CD carousel slides out

2 Replace the discs in the left and right disc trays

- If you press **DISC CHANGE** again during playback, the CD will stop playing
  - → The CD carousel will rotate until the inner tray is rotated out and is ready for loading.

3 Press **OPEN•CLOSE** to close the CD compartment

Digital Control

The Digital Control feature enables you to adjust the system to suit your type of music

INCREDIBLE SURROUND

Normal stereo sound is determined by the distance between the front speakers. When Incredible Surround is switched on, it magnifies the virtual distance between the front speakers for an incredibly wide, enveloping stereo effect.

- Press **INCREDIBLE SURROUND** to switch on
  - → The INCREDIBLE SURROUND display lights up
  - → "INCREDIBLE SURROUND ON" will be displayed.

To switch off Incredible Surround
- Press **INCREDIBLE SURROUND** again
  - → The INCREDIBLE SURROUND display is switched off
  - → "INCREDIBLE SURROUND OFF" will be displayed.

BASS/TREBLE

There are 7 different BASS/TREBLE levels available for selection.

- **Rotate the BASS** or **TREBLE** to select the desired bass or treble level respectively.
  - → The BASS/TREBLE level will increase or decrease between level +3 and −3
  - → If BASS is selected, the display will show either "BASS +X or -X".
  - → If TREBLE is selected, the display will show either "TREBLE +X or -X".

Note:
- *"X" denotes the sound level.*

LOUDNESS

Special sound effect that provides some kind of bass, treble accentuation effect specially for low volume level. It can be switched on additionally to all sound settings

- Press **LOUDNESS** to switch on.
  - → The LOUDNESS display lights up
  - → "LOUDNESS ON" will be displayed

To switch off Loudness sound effect
- Press **LOUDNESS** again.
  - → The LOUDNESS display is switched off.
  - → "LOUDNESS OFF" will be displayed

Flat

This feature allows you to temporarily switch off all the DIGITAL CONTROL setting (e.g. Bass, Treble, Incredible Surround, etc.).

- Press **FLAT** to switch off the digital control setting.
  - → The FLAT display lights up.
  - → "FLAT ON" will be displayed.
- Press **FLAT** again to restore the previous setting.
  - → The FLAT display is switched off.
  - → "FLAT OFF" will be displayed.

Selecting a desired track

Selecting a desired track when playback is stopped

1 Press |◀◀ or ▶▶| *(or |◀ / ▶| on the remote control)* until the desired track appears on the display.

2 Press **PLAY** ▶ to start playback.
  - → The selected track number and elapsed playing time appear on the display.

Selecting a desired track during playback
- Press |◀◀ or ▶▶| *(less than 0.5 seconds)* until the desired track appears on the display.
  - → The selected track number and elapsed playing time appear on the display.
- If you press |◀◀ once it will skip to the beginning of the current track and play the track again.

Searching for a particular passage during playback

- Press and hold **SEARCH** |◀◀ or ▶▶| *(or ◀◀ / ▶▶ on the remote control)* until the desired passage is located.
  - → The volume will be reduced.
- Play returns to normal when **SEARCH** |◀◀ or ▶▶| is released.

Programming Tracks

Programming tracks of a loaded CD is possible when playback is stopped. The display will indicate the total tracks stored in the program. Up to 40 tracks can be stored in the memory in any order. When 40 tracks are stored and you attempt to store another track, the display will show "FULL".

1 Load the desired discs in the disc trays.

2 Press **PROGRAM** to start programming.
  - → The PROGRAM flag starts flashing.
  - → It will cancel any previously selected repeat mode.

3 Press the **3 CDC** button to select the disc.

4 Press |◀◀ or ▶▶| *(or |◀ / ▶| on the remote control)* to select the desired track.

5 Press **PROGRAM** to store the track.

- Repeat steps ***3*** to ***5*** to store other discs and tracks.

6 Press **STOP** once to end programming.
  - → The total number of tracks programmed and total playing time appear on the display.

Notes:
- *If the total playing time is more than "99:59" or if one of the programmed tracks has a number greater than 30, then "- - : - -" appears on the display instead of the total playing time*
- *During programming, if no button is pressed within 20 seconds, the system will exit program mode automatically.*

Reviewing the program

Reviewing of the program is possible only when playback is stopped.

- Press |◀◀ or ▶▶| repeatedly to review the programmed tracks
- Press **STOP** to exit review mode

Playing the program

1 Press **PLAY** ▶ to start program playback.
  - → "PLAY PROGRAM" appears on the display.
  - → The track number and elapsed playing time of the current track will appear on the display.

- If you press **REPEAT** during program playback, the current track or all programmed tracks will be played repeatedly.
  - → "TRACK" or "PROGRAM" will be displayed.
  - → The REPEAT and PROGRAM flags will be displayed

2 Press **STOP** to stop program playback

Notes:
- *If you press any of the CD DIRECT PLAY buttons, the system will play the selected disc or track and the stored program will be ignored temporarily. The PROGRAM flag also will disappear temporarily from the display. It will reappear when playback of the selected disc ends*
- *REPEAT DISC mode will be cancelled when program playback begins*

Erasing the program *(when playback is stopped)*

- Press **STOP**
  - → "PROGRAM CLEARED" will be displayed.

Note:
- *The program will be erased when the system is disconnected from the power supply or when the CD carousel is opened. If the CD carousel is opened, the tracks belonging to the outer two trays will be erased and the display will show "TRACKS CLEARED".*

Shuffle *(only on remote control)*

In shuffle mode, the system plays all the available discs and their tracks in random order. Shuffle may be used also when tracks are programmed.

To shuffle all the discs and tracks

1 Press **SHUFFLE**
  → "SHUFFLE" will be displayed
  → The SHUFFLE flag, the disc and the track selected at random appear on the display
- The discs and the tracks will be played in random order until you press **STOP**.
- If you press **REPEAT** during shuffling, the current track or all available discs will be played repeatedly
  → "TRACK" or "ALL" will be displayed
  → The REPEAT and SHUFFLE flags will be displayed

2 Press **SHUFFLE** again to resume normal playback
  → The SHUFFLE flag disappears from the display.

Note
- *REPEAT DISC mode will be cancelled when shuffle is selected*

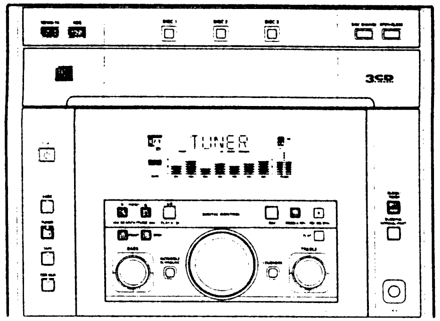
Repeat *(only on remote control)*

You can play the current track, a disc or all available discs repeatedly.

1 Press **REPEAT** on the remote control to select the various repeat modes
  → "TRACK", "DISC", "ALL" or "OFF" will be displayed
  → The REPEAT flag appears on the display
- The selected track, selected disc or all available discs will now be played repeatedly until you press **STOP**

2 Press **REPEAT** until the "OFF" mode is displayed to resume normal playback
  → The REPEAT flag disappears from the display

Notes
- *REPEAT DISC mode is not available during program play or shuffling mode*
- *You can also repeat shuffling a program.*
  → *"REPEAT TRACK" or "REPEAT PROGRAM" will be displayed*
  → *The REPEAT, PROGRAM and SHUFFLE flags appear on the display*



Note:
- *For 'EASY SET' feature, please refer to page 11*

Tuning to radio stations

1 Press **TUNER** to select TUNER mode.
  → "TUNER" will be displayed.
  A few seconds later, the current radio frequency will be displayed.

2 Press **TUNER** again to select the desired waveband : FM, MW or LW.

3 Press **TUNE** ⏮ or ⏭ *(or ◀◀/▶▶ on the remote control)* for more than one second, then release.
  → The display will show "SEARCH" until a radio station with sufficient signal strength is found.
- Repeat this procedure until the desired station is reached.
- To tune to a weak radio station, briefly press **TUNE** ⏮ or ⏭ repeatedly until the display shows the desired frequency and/or when the best reception has been obtained.

Note:
- *Before activate TUNING function on the system, make sure that the PRESET mode is switched off.*

Storing Preset Stations

You can store up to 40 radio stations in the memory. When a preset radio station is selected, the preset number appears next to the frequency on the display.

Automatic programming

1 Press **TUNER**

2 Press **PROGRAM** for more than one second
  → The PROGRAM flag starts flashing and "AUTO" will be displayed.
  → The system will search for every available station in the FM waveband first, then search by the MW and LW wavebands
  → All available radio stations will be stored automatically. The frequency and preset number will be displayed briefly.
  → The system will stop searching when all the available radio stations are stored or when the memory for 40 preset radio stations is used
  → The system will remain tuned to the last stored preset radio station

Notes
- *You can cancel the automatic programming by pressing PROGRAM or STOP (on the system only)*
- *If you want to reserve a section of preset numbers, for example preset numbers 1 to 9, select preset 10 before starting automatic programming only the preset numbers 10 to 40 will be programmed*

Manual programming

1 Press **TUNER**.

2 Press **TUNER** again to select the desired waveband : FM, MW or LW.

3 Press **PROGRAM** for less than one second
  → The PROGRAM flag starts flashing
  → The next available preset number will be displayed for selection.

4 Press **TUNE** ⏮ or ⏭ *(or ◀◀/▶▶ on the remote control)* to tune to the desired frequency
- If you wish to store the radio station to another preset number, first select PRESET mode, then press **PRESET ▼** or ▲ to select the desired preset number.
  → The PRESET flag will be displayed

5 Press **PROGRAM** again
  → The PROGRAM flag disappears and the radio station will be stored

- Repeat the ***steps 3 to 5*** to store other preset radio stations

Notes
- *When 40 radio stations are stored and you attempt to store another radio station, the display will show "FULL". If you want to change an existing preset number, repeat steps 3 – 5.*
- *You can cancel manual programming by pressing STOP (on the system only).*
- *During programming, if no button is pressed within 20 seconds, the system will exit program mode automatically.*
- *When in programming mode, the PRESET mode will automatically be activated.*

Tuning to Preset Radio Stations

1 Press **PRESET** to switch on the PRESET mode.
  → The PRESET flag will be displayed.

2 Press **PRESET ▼** or **▲** *(or ⏮/⏭ on the remote control)* to select the desired preset number.
  → The preset number, radio frequency, and waveband appear on the display.

Receiving RDS Radio Station

RDS (Radio Data System) is a broadcasting service that allows FM stations to send additional information along with the regular FM radio signal. This additional information can contain:

- **STATION NAME:** The radio station name is displayed.
- **PROGRAM TYPE:** The following program types exist and can be received by your tuner: News, Affairs, Info, Sport, Educate, Drama, Culture, Science, Varied, Pop M, Rock M, M.O.R. (middle of the road music), Light M, Classics, Other M, No type.
- **RADIO TEXT (RT):** text messages appear in the display.

When you have tuned to a RDS station, the RDS logo (and the radio station name will appear on the display:

- The display normally shows the radio station name if available
  By repeatedly pressing **RDS** button you can change the type of display information:
  → The display shows in turn:
  STATION NAME → PROGRAM TYPE → RADIO TEXT → TUNED FREQUENCY → STATION NAME ...

Note:
- *When you press the RDS button and the display shows "NO RDS", it indicates that either the tuned station is not transmitting RDS signal or it is a non RDS station.*

RDS Clock

Some RDS station may be transmitting a real clock time at an interval of every minute.

Setting the time with RDS clock

1 Press **CLOCK/TIMER**
  → "- - : - -" or current time appears on the display

2 Press **CLOCK/TIMER** once more to enter clock setting mode.
  → "00:00" or current time starts flashing.

3 Press **RDS**.
  → The message "SEARCH RDS TIME" will be displayed.
  → If the station does not transmit RDS clock, "NO RDS TIME" will be displayed.
  → When the RDS clock is read, "RDS TIME" will be displayed. The current clock time is displayed for 2 seconds and will be stored automatically.
  → If within 90 seconds, the RDS time is not detected, "NO RDS TIME" will be displayed.

NEWS•TA (Traffic Announcement) *(only available in Radio Station with RDS)*

You can activate NEWS or TA function in Standby, Demonstration or any source mode except Tuner mode. Once the News Program Type (for NEWS function) or Traffic Announcement data (for TA function) is detected in any of the selected RDS stations, it will switch to TUNER mode automatically.

NEWS•TA key toggles in the following sequence

NEWS → TA → OFF → NEWS

To start NEWS or TA function

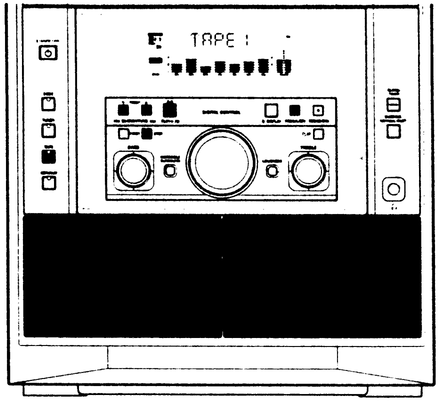
1 Press **NEWS•TA** to select NEWS function.
  → The NEWS flag and "NEWS" will be displayed.
- If you want to select TA function, press **NEWS•TA** again.
  → The TA flag and "TA" will be displayed.

2 When NEWS or TA is selected.
- It will scan RDS stations stored in the first 5 preset and wait for the News Program Type / Traffic Announcement data to be available in any of these RDS stations. During the search :
  → The current source activity will remain uninterrupted.
  → If no RDS station is found in the first 5 presets, the NEWS•TA function will be switched off. The display will show "NO RDS NEWS" or "NO RDS TA" and NEWS or TA flag will disappear from the display
- When NEWS•TA transmission is detected, the system will switch to Tuner mode.
  → The NEWS or TA flag starts flashing

To cancel NEWS or TA function

- Press **NEWS•TA** until the NEWS or TA flag disappears and "TA OFF" is displayed

Notes:
- *If you are listening to a non RDS TUNER radio station and should you decide to hear NEWS or TA, first select other source (e.g. 3CDC, TAPE or CDR/AUX), then press NEWS•TA*
- *Before using the NEWS or TA feature, ensure that the first 5 presets are RDS stations.*
- *The NEWS•TA works only once for each activation.*
- *During News bulletin or Traffic Announcement, you can press any available source or Tuner function keys to cancel NEWS•TA function and execute the relevant source mode.*
- *If set is switched to Tuner source, the NEWS•TA function will be cancelled. "NEWS OFF" or "TA OFF" will be displayed immediately after the "TUNER" message.*



Tape Playback

1 Press **TAPE** to select TAPE mode
  → "TAPE 1" or "TAPE 2" will be displayed.
- Press **TAPE** again to select either tape deck 1 or tape deck 2

2 Load the tape into the desired tape deck.

3 Press **PLAY ▶** to start playback.

3a (For Tape Deck 2 only)
  Press **A•B** (SIDE) to switch playback between side A and B.
  → The BACK or FRONT flag appears on the display, depending on the side selected.

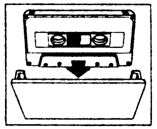
3b (For Tape Deck 2 only)
  Press **A. REV** to select the different type of playback mode *(see auto reverse playback)*.

4 Press **STOP** to end playback.

Note:
- *To change side before playback begins, use the SIDE button on the remote control.*

Loading a tape

- Press on the tape deck to open the tape deck door.
- Load the tape with the open side downward and the full spool to the left
- Close the tape deck door.



Auto Reverse Playback *(only on tape deck 2)*

- Press **A. REV** to select the different playback modes

═ .... to record or playback on one side of the tape. The tape stops at the end of one side

⊃ ...... to record or playback on both sides of the tape. The tape then stops

⊂⊃ ... to playback continuously on both sides of the tape up to a maximum of 10 times per side unless you press **STOP**

Rewind/Fast Forward

When playback is stopped

1 You can rewind or fast forward the tape by pressing ⏮ or ⏭ *(or ◀◀/▶▶ on the remote control)* respectively
  → "TAPE 1 XXX" or "TAPE 2 XXX" will be displayed depending on which button is pressed.
  → The tape will stop automatically at the end of the rewinding or fast forwarding

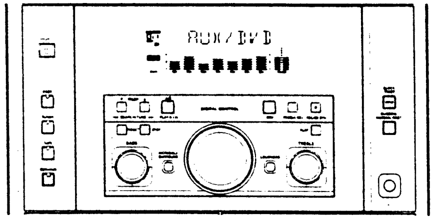
2 Press **STOP** to stop rewinding or fast forwarding

During playback

- Press and hold ⏮ or ⏭ (or ◀◀ / ▶▶ on the remote control) until the desired passage is located
  - → During searching the sound is reduced to a low volume
  - → When you release ⏮ or ⏭ the tape continues playing

Notes

- *"[illegible]" denotes the tape counter number It will automatically set to zero after detecting end of tape or changing tape play direction on TAPE 2 To reset the tape counter number to zero during playback, press the DIM button for more than 2 seconds*
- *During rewinding or fast forwarding of a tape, it is also possible to select another source (e g 3 CDC, TUNER or CDR/AUX).*
- *Before use check and tighten slack tape with a pencil Slack tape may get jammed or may burst in the mechanism*
- *C-120 tape is extremely thin and is easily deformed or damaged It is not recommended for use in this system.*
- *Store the tapes at room temperature and do not put them too close to a magnetic field (for example, a transformer, TV, or speaker).*



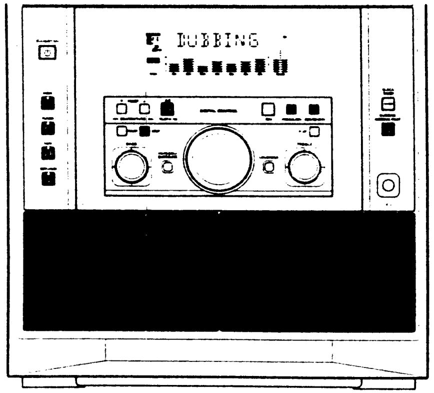
Selecting External Equipment

If you have connected the audio out terminals of the external equipment (TV, VCR, Laser Disc player, DVD player, or CD Recorder) to the AUX/CDR IN terminals, you can hear the enhanced sound from the system

- Press **CDR/AUX** to select AUX-DVD mode
  - → "AUX/DVD" will be displayed.
- Press **CDR/AUX** again to select the CDRW mode.
  - → "CDRW" will be displayed.

Notes:

- *There are two external modes:*
  - *i. the normal AUX/DVD mode.*
  - *ii. the CDRW mode; where the LINE OUT of this mini system is muted. You will not be able to record or listen to the sound from the LINE OUT.*
- *You are advised not to listen to and record from the same source simultaneously.*
- *All the sound control features (e.g. Incredible Surround, Bass/Treble, etc) are available for selection.*



Notes

- *For recording, use only tape of IEC type I (normal tape) or IEC type II (CrO_2).*
- *The tape is secured at both ends with leader tape. At the beginning and end of tape, nothing will be recorded for 6 to 7 seconds.*
- *The recording level is set automatically, regardless of the position of Volume, Incredible Surround or Bass/Treble*
- *To prevent accidental recording, break out the tab on the left shoulder of the tape side you want to protect.*
- *If "CHECK TAPE" is displayed, the protection tab has been broken. Put a piece of clear adhesive tape over the opening. Do not cover the CrO_2 tape detection hole when covering the tab opening.*

Recording from other sources

(only on tape deck 2)

1. Press **TAPE** to select tape deck 2.
2. Load a blank tape into tape deck 2 with the open side downward.
3. Press **SIDE** on remote control to select the recording side.
   - → The BACK or FRONT flag will be displayed, depending on the side selected.
4. Press **3 CDC**, **TUNER** or **CDR/AUX**.
   - Start playback of the selected source.
5. Press **REC** to start recording.
   - → The REC flag starts flashing.
6. Press **STOP** to stop recording.

Notes:

- *Only ⊐ or ⊃⊃ mode is available during recording.*
- *During recording, it is not possible to listen to another source.*

Dubbing tapes *(from tape deck 1 to tape deck 2)*

1. Press **TAPE** to select tape deck 2.
2. Load the prerecorded tape into tape deck 1 and a blank tape into tape deck 2
   - Make sure the tape in tape deck 1 has its full spool to the left.
3. *(For Tape Deck 2 only)* Press **SIDE** on the remote control to select the recording side.
4. Press **DUBBING NORMAL•FAST** ***once*** for normal speed dubbing or ***twice*** *(within 2 seconds)* for high speed dubbing.
   - → "NORMAL" (normal speed) or "FAST" (high speed) will be displayed, followed by "DUBBING".
   - → The HSD flag appears on the display during high speed dubbing.
   - Dubbing will start immediately.
   - → The REC flag starts flashing
5. Press **STOP** to stop dubbing

Notes:

- *At the end of side A, flip the tapes to side B and repeat the procedure.*
- *Dubbing of tapes is only possible from tape deck 1 to tape deck 2.*
- *To ensure good dubbing, use tapes of the same length*
- *During high speed dubbing in Tape mode, the sound is reduced to a low volume.*
- *You can listen to another source while dubbing.*

CD Synchro Start Recording

During CD synchro start recording,

- Do not fast forward/rewind your tape in tape deck 1.
- Do not listen to another source.

1. Press **TAPE** to select tape deck 2.
   - Load a blank tape into tape deck 2 with the open side downward.
2. Press **SIDE** on remote control to select the recording side.
3. Press **A. REV** to select the playback mode (⊐ or ⊃⊃).
4. Press **3 CDC**.
   - You can program the tracks in the order you want them to be recorded (see Programming Tracks). If you do not, the tracks are recorded according to the order on the selected disc
5. Press **CD SYN** to start recording.
   - → The REC flag starts flashing
6. Press **STOP** to stop recording CD playback.

One Touch Recording

- For One Touch Recording, as soon as you press **REC**, the current source (3 CDC, TUNER or CDR/AUX) will be recorded on tape deck 2

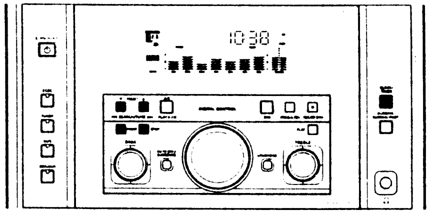
1. Load a blank tape in tape deck 2
2. Press **REC** to start recording
   - → The REC flag starts flashing
3. Press **STOP** to stop recording

Note.

- *When you press RECORD while in TAPE mode, "SELECT SOURCE" will be displayed One Touch Recording is not possible in TAPE mode.*

Digital Recording via Digital Out

For CD digital recording please refer to the Instructions Manual of the CD Recorder digital audio equipment, etc



Viewing the Clock

You can view the clock (if it is set) while the system is in standby mode or any source mode. It will be displayed for about 7 seconds.

- Press **CLOCK/TIMER** briefly *(on the system only).*
  - → " 10:38" (the current time) will be displayed.
  - → "- - : - -" will be displayed if the clock is not set.

Setting the Clock

The clock is set in 24-hour mode, e.g. "00:00" or "23:59". Before setting the clock, you must be in the View Clock mode.

1. Press **CLOCK/TIMER** to select clock mode.
   - → "00:00" or the current time starts flashing
2. Press ⏮ or ⏭ to set the hour *(PRESET mode OFF).*
3. Press ⏮ or ⏭ to set the minute *(PRESET mode ON).*
4. Press **CLOCK/TIMER** again to store the setting.
   - → The clock starts.

- To exit without storing the setting, press **STOP** on the system

Notes:

- *During clock setting, if no button is pressed within 90 seconds, the system will exit clock setting mode automatically.*
- *When a power interruption occurs, the clock setting is erased*
- *To set the time with RDS clock, see "Receiving RDS Radio Station" under TUNER section.*

Setting the Timer

- The system can switch on to CD, TUNER, or TAPE 2 mode automatically at a preset time. It can serve as an alarm to wake you up.
- Before setting the timer, make sure the clock is set correctly.
- The timer will always be switched on once it is set
- **The volume of the timer will start to increase from the minimum level until the volume level before the set is switched to standby mode.**

1. Press and hold **CLOCK/TIMER** for more than 2 seconds to select timer mode
   - → "00:00" or the last set timer starts flashing. The TIMER flag flashes.
   - → The last selected source is lit while other available sources are flashing
2. Press **3 CDC**, **TUNER** or **TAPE** to select the desired source.
   - Before selecting CD or TAPE, make sure a CD or tape is loaded in the CD tray or tape deck 2
3. Press ⏮ or ⏭ to set the hour for the timer to start *(PRESET mode OFF).*
4. Press ⏮ or ⏭ to set the minute for the timer to start *(PRESET mode ON).*
5. Press **CLOCK/TIMER** to store the start time
   - → The timer is now set
   - → The TIMER flag remains on the display

- At the preset time, the timer will be activated
  - → The selected source will be played

Notes

- *During timer setting, if no button is pressed within 90 seconds, the system will exit timer setting mode automatically.*
- *If the source selected is TUNER, the last tuned frequency will be switched on.*
- *If the source selected is CD, playback will begin with the first track of the last selected disc. If the CD trays are empty, the TUNER will be selected instead.*
- *If the source selected is TAPE, and if the preset time is reached during high speed dubbing, the TUNER will be selected instead.*
- *If the recording is active, the timer will be cancelled.*

To switch off the TIMER

1 Press **CLOCK/TIMER** for more than 2 seconds *(or* ***TIMER*** *on the remote control)*

2 Press **STOP** on the system to cancel the timer
  - → The timer is now switched off
  - → The display will show "OFF" and the TIMER flag disappears

To start the TIMER again *(for the same preset time and source)*

1 Press **CLOCK/TIMER** for more than 2 seconds *(or* ***TIMER*** *on the remote control)*

2 Press **CLOCK/TIMER** again to store the start time
  - → The timer is now switched on
  - → The TIMER flag appears on the display

Sleep *(only on remote control)*

This feature allows you to select a length of time after which the system will switch to the standby mode automatically.

- Press **SLEEP** on the remote control repeatedly to select a period of time.
  - → The selections are as follows (time in minutes):
    60 → 45 → 30 → 15 → OFF → 60 .
  - → "SLEEP XX" or "OFF" will be displayed. "XX" is the time in minutes.
- When you reach the desired length of time, stop pressing the **SLEEP** button.
  - → After this amount of time passes, the system will switch to the standby mode.

To switch off the sleep timer

- Press **SLEEP** repeatedly until "OFF" is displayed, or press the **STANDBY•ON** button.

Tape Deck Operation

"RECORDING ACTIVE" is displayed.

- A recording is in progress.
- → *Stop the recording or wait until it is finished*

"CHANGE TO TAPE" is displayed.

- Tape dubbing is only possible in tape mode.
- → *Switch to tape mode by pressing TAPE.*

Recording or playback cannot be made or there is a decrease in audio level.

- Dirty tape heads, capstans or pressure rollers.
- → *See section on tape deck maintenance.*
- Magnetic build-up in the record/playback head
- → *Use demagnetizing tape.*

General

System does not react when any button is pressed.

- Electrostatic discharge
- → *Press STANDBY•ON to switch the system off. Remove the AC power plug from the wall outlet, then reconnect the power plug and switch on the system again*

No or poor sound.

- Volume is not turned up
- → *Adjust VOLUME.*
- The headphones are connected.
- → *Disconnect the headphones*
- Speakers are not connected or are connected wrongly
- → *Check that the speakers are connected correctly.*
- → *Make sure the stripped speaker wire is clamped*

Reversed left and right sound.

- Speakers are connected wrongly
- → *Check the speaker connections and location.*

Lack of bass sound or apparently imprecise physical location of musical instruments.

- Speakers are connected wrongly
- → *Check the speaker connection for proper phasing, red/black wires to red/black terminals*

Remote control has no effect on the system.

- Wrong source is selected.
- → *Select the source (CD, TUNER, etc.) before pressing the function button. (▶, ⏮, ⏭, etc.)*
- The distance to the system is too large
- → *Reduce the distance*
- Batteries are inserted incorrectly
- → *Insert the batteries with their polarities (+/– signs) as indicated*
- Batteries are exhausted
- → *Replace the batteries*

Timer not working.

- Clock is not set
- → *Set the clock*
- Timer is not switched on
- → *Press CLOCK/TIMER to switch on the timer*
- Recording is in progress
- → *Stop dubbing/recording*

Clock setting is erased.

- There was a power failure
- → *Reset the clock*

System displays features automatically, buttons flash continuously.

- Demonstration mode is switched on
- → *Press and hold STOP (on the system only) for 5 seconds to switch off the demonstration*

A howling sound at external source.

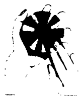
- You hear feedback when you are listening and recording from the same source simultaneously.
- → *Press CDR/AUX to select CDRW mode*

Maintenance

Cleaning the Cabinet

- Use a soft cloth slightly moistened with a mild detergent solution. Do not use a solution containing alcohol, spirits, ammonia or abrasives.

Cleaning Discs



- When a disc becomes dirty, clean it with a cleaning cloth. Wipe the disc from the center out.
- Do not use solvents such as benzine, thinner, commercially available cleaners or antistatic spray intended for analog records.

Cleaning the CD lens

- After prolonged use, dirt or dust may accumulate at the CD lens. To ensure good playback quality, clean the CD lens with Philips CD Lens Cleaner or any commercially available cleaner. Follow the instructions supplied with cleaner.

Cleaning the Heads and the Tape Paths

- To ensure good recording and playback quality, clean the heads, the capstan(s) and pressure roller(s) after every 50 hours of tape operation.
- Use a cotton swab slightly moistened with cleaning fluid or alcohol
- You can also clean the heads by playing a cleaning tape once

Demagnetizing the heads

- Use a demagnetizing tape available at your dealer.

Warning! Under no circumstances you should try to repair the set yourself as this will invalidate the guarantee. Do not open the set as there is a risk of electric shock.

- If a fault occurs, check the points listed below before taking the system for repair.
- Should any problems persist after you have made these checks, consult your nearest dealer or service center.

CD Player Operation

"NO DISC" is displayed.

- The disc is inserted upside down.
- → *Place CD with printed side up.*
- Moisture condensation at the lens.
- → *Wait until lens has adjusted to normal room temperature.*
- There is no disc in the CD tray.
- → *Insert a CD.*
- The CD is dirty, badly scratched or warped.
- → *Clean or replace the CD.*
- The CD lens is dirty or dusty.
- → *See section under Maintenance.*

"DISC NOT FINALIZED" is displayed.

- The CD-RW or CD-R disc is not properly recorded for the use of a standard CD player.
- → *Read the instruction booklet of your CD-Rewritable or CD-Recorder on how to finalize a recording.*
- The CD is badly scratched or dirty.
- → *Replace or clean CD.*

Radio Reception

Poor radio reception.

- The signal is too weak.
- → *Adjust the antenna.*
- → *Connect an external antenna for better reception*
- The TV or VCR is too close to the stereo system.
- → *Separate the stereo system from the TV or VCR.*

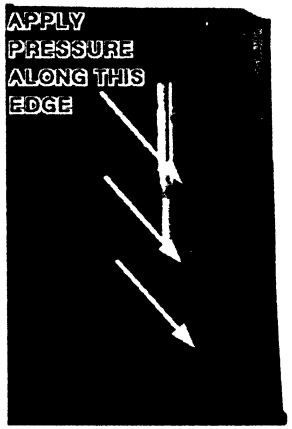
"NO RDS TEXT" is displayed.

- RDS text message is not available.
- → *Select another RDS station.*

DISMANTLING INSTRUCTIONS

Dismantling of the Cassette Cover

Remove Cassette Door

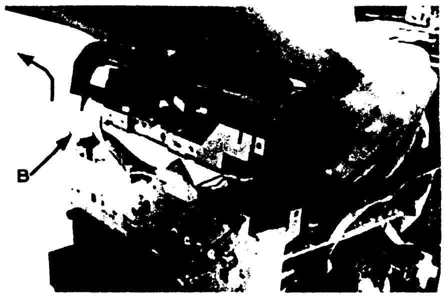


Cassette Door

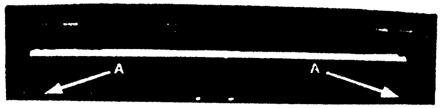
Dismantling of the CDC Module and Front Panel

1) Loosen the 16 screws to remove the Cabinet Rear (pos 259) of the set :-
    - 5 screws each on the left side & right side of the Cabinet Rear.
    - 6 screws at the rear of the Cabinet Rear.
2) Slide out the CDC tray and remove the Cover Tray CDC (pos 112) as indicated.
3) Loosen 2 screws A and 2 screws B to remove the CDC Module (pos 1104) as indicated.
4) Remove 1 screw (pos 305) at the bottom to separate the Front Panel Assembly from the Plate Bottom (pos 231).

Remove Cover Tray CDC



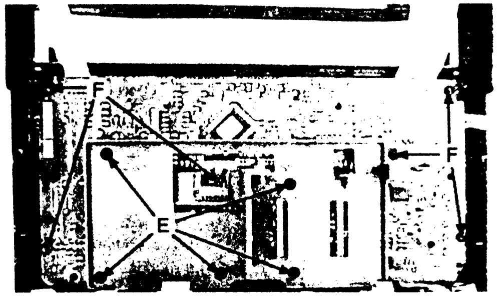
Remove CDC Module



Front CDC

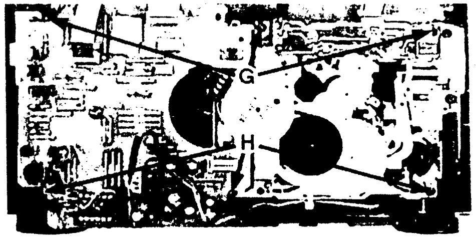
Dismantling of the Front Board

1) Remove 5 screws E as indicated to loosen the Plate Front (pos 254).
2) Remove 6 screws F as indicated to loosen the Front Board (pos 1102-A).



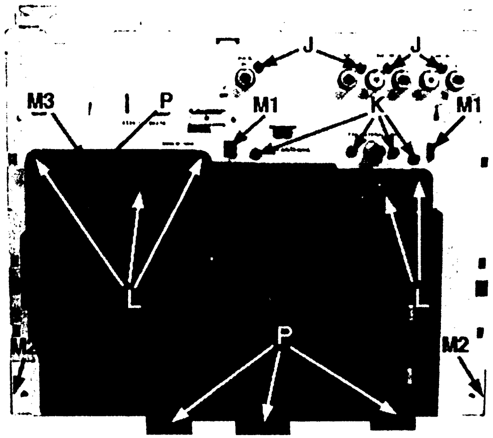
Dismantling of the ETF Module

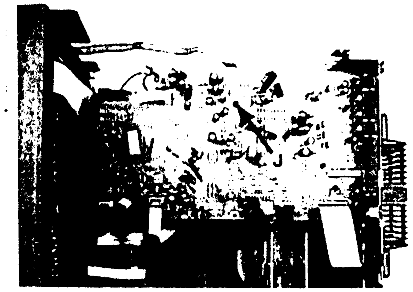
1) Remove 6 screws (3 screws G and 3 screws H) as indicated to loosen the ETF Module (pos 1105).



Dismantling of Rear Portion

1) Remove 5 screws J as indicated to loosen the AF Board (pos 1101).
2) Remove 4 screws K and uncatch M1 as indicated to loosen the Tuner Board (pos 1100).
3) Remove 5 screws L and uncatch M2 as indicated to take out the Plate Rear(pos 229).
4) Remove 4 screws P and uncatch M3 as indicated to free the Power Module (pos 1103) from the Bottom Plate assembly.





AF Board Top View

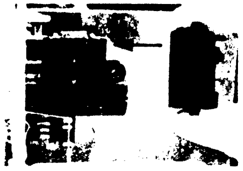
Repair Hints

2) During re-assembly of the Power Module, place the **Bracket Mains Socket** (pos 232) behind the **Mains Socket** and catch it onto the Rucksack (pos 1103-201)of the Power Module. See pictures 1 and 2.

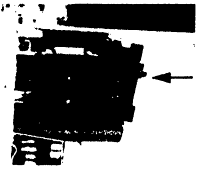
3) During re-assembly of the set, care should be taken to dress all the flex cable wires properly to prevent any damaged cause by any sharp metal edges or any other metal parts. See picture 3.

4) Due to the short flex cable wires in the ETF Module, the pc board should be disconnected and reconnected on the reverse side of the tape mechanism to keep it electrically connected during repair. See picture 4.

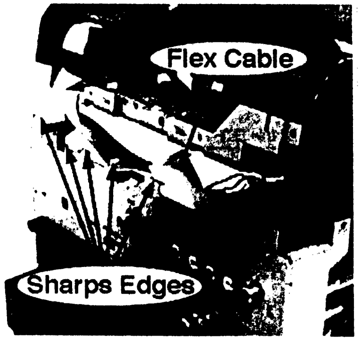
5) During repair it is possible to disconnect the Tuner board and CDC Module completely unless the fault is suspected to be in that area. This will not affect the performance of the rest of the set.



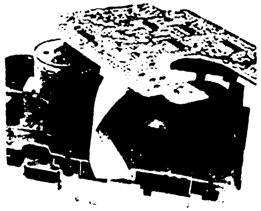
Picture 1



Picture 2

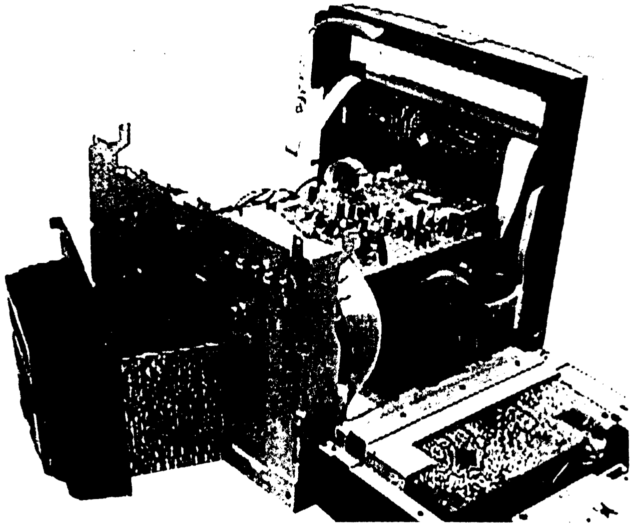


Picture 3

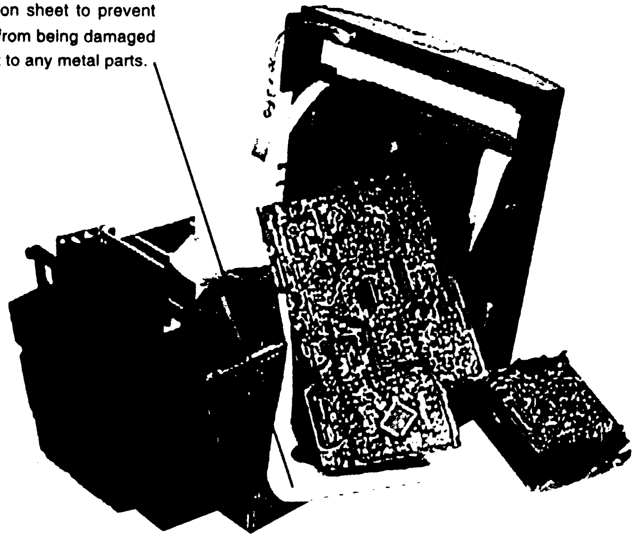


Picture 4

Service pos A

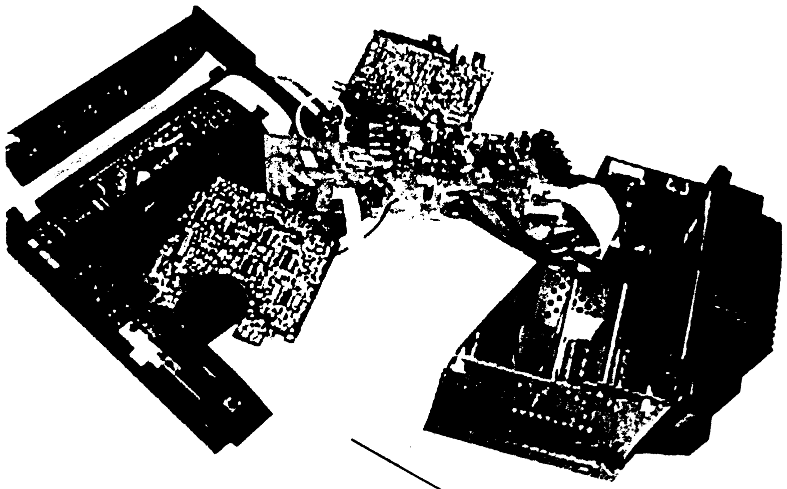


Service pos B



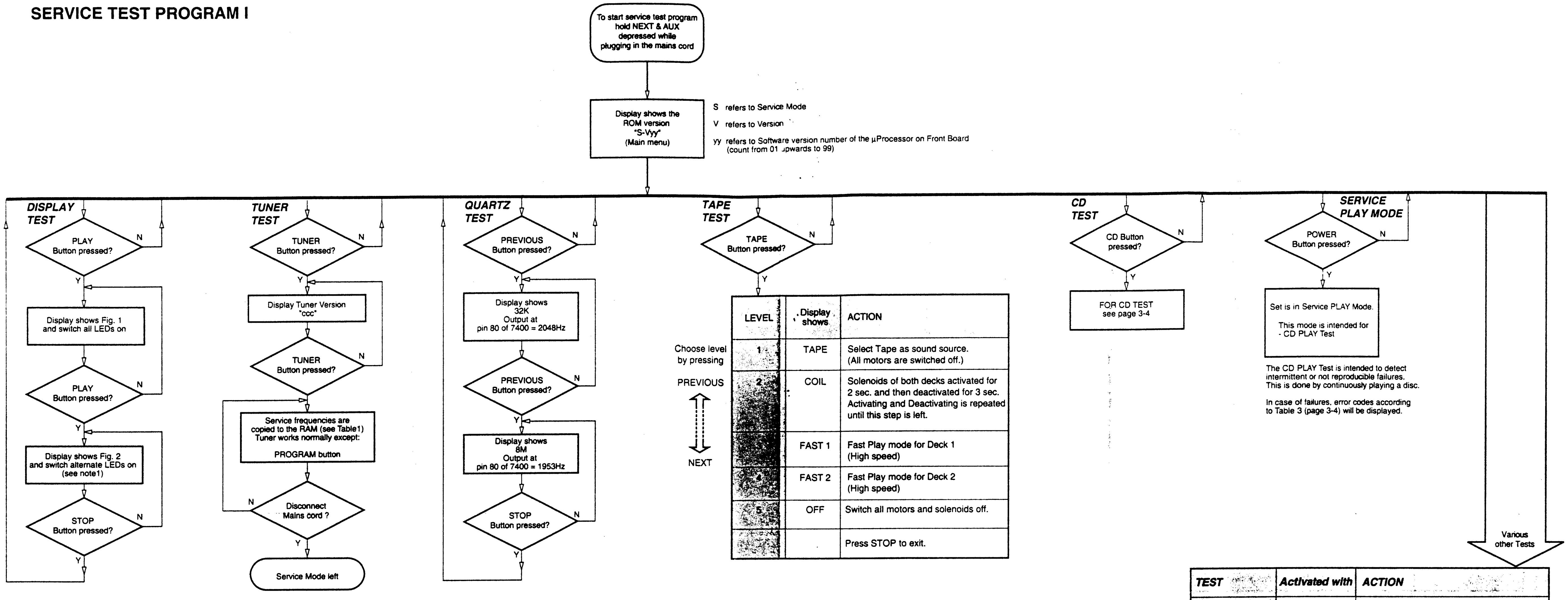
Use a insulation sheet to prevent the AF board from being damaged or short-circuit to any metal parts.

Service pos C



Use a insulation sheet to prevent the ETF and AF board from being damaged or short-circuit to any metal parts.

SERVICE TEST PROGRAM I


To start service test program hold NEXT & AUX depressed while plugging in the mains cord
Display shows the ROM version "S-Vyy" (Main menu)
DISPLAY TEST
PLAY Button pressed?
N
Y
Display shows Fig. 1 and switch all LEDs on
PLAY Button pressed?
N
Y
Display shows Fig. 2 and switch alternate LEDs on (see note1)
STOP Button pressed?
N
Y
TUNER TEST
TUNER Button pressed?
N
Y
Display Tuner Version "ccc"
TUNER Button pressed?
N
Service frequencies are copied to the RAM (see Table1) Tuner works normally except: PROGRAM button
Disconnect Mains cord ?
N
Y
Service Mode left
QUARTZ TEST
PREVIOUS Button pressed?
N
Y
Display shows 32K Output at pin 80 of 7400 = 2048Hz
PREVIOUS Button pressed?
N
Y
Display shows 8M Output at pin 80 of 7400 = 1953Hz
STOP Button pressed?
N
Y
TAPE TEST
TAPE Button pressed?
N
Y
Choose level by pressing
PREVIOUS
NEXT
CD TEST
CD Button pressed?
N
Y
FOR CD TEST see page 3-4
SERVICE PLAY MODE
POWER Button pressed?
N
Y
Set is in Service PLAY Mode.
This mode is intended for
- CD PLAY Test
Various other Tests

S refers to Service Mode

V refers to Version

yy refers to Software version number of the µProcessor on Front Board (count from 01 upwards to 99)

LEVEL	Display shows	ACTION
1	TAPE	Select Tape as sound source. (All motors are switched off.)
2	COIL	Solenoids of both decks activated for 2 sec. and then deactivated for 3 sec. Activating and Deactivating is repeated until this step is left.
3	FAST 1	Fast Play mode for Deck 1 (High speed)
4	FAST 2	Fast Play mode for Deck 2 (High speed)
5	OFF	Switch all motors and solenoids off.
		Press STOP to exit.

The CD PLAY Test is intended to detect intermittent or not reproducible failures. This is done by continuously playing a disc.

In case of failures, error codes according to Table 3 (page 3-4) will be displayed.

PRESET	Europe "EUR"	East Europe Extended-band "EAS"	East Europe "EAS"	USA "USA"	Oversea "OSE"
1	87.5MHz	65.81MHz	87.5MHz	87.5MHz	87.5MHz
2	108MHz	108MHz	108MHz	108MHz	108MHz
3	531kHz	74MHz	531kHz	530kHz	531/530kHz
4	1602kHz	87.5MHz	1602kHz	1700kHz	1602/1700kHz
5	558kHz	531kHz	558kHz	560kHz	558/560kHz
6	1494kHz	1602kHz	1494kHz	1500kHz	1494/1500kHz
7	153kHz	558kHz	87.5MHz	98MHz	87.5/98MHz
8	279kHz	1494kHz	87.5MHz	87.5MHz	87.5MHz
9	198kHz	98MHz	87.5MHz	87.5MHz	87.5MHz
10	98MHz	70.01MHz	87.5MHz	87.5MHz	87.5MHz
11	87.5MHz	65.81MHz	98MHz	87.5MHz	98/87.5MHz

Table 1

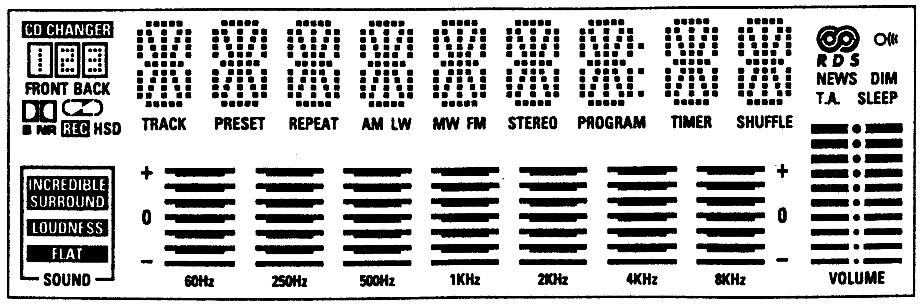
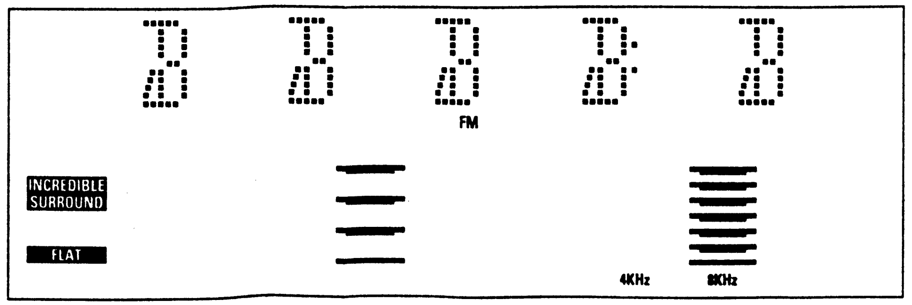

CD CHANGER
FRONT BACK
B NR
REC
HSD
TRACK
PRESET
REPEAT
AM LW
MW FM
STEREO
PROGRAM
TIMER
SHUFFLE
RDS
NEWS
DIM
T.A.
SLEEP
INCREDIBLE SURROUND
LOUDNESS
FLAT
SOUND
+
0
-
60Hz
250Hz
500Hz
1KHz
2KHz
4KHz
8KHz
VOLUME

Figure 1

Keys activated	Display shows	Keys activated	Display shows	Keys activate	Display shows
No Key pressed	--	NEWS / TA *	9	HS DUBBING	19
Any Remote control key	RC	RDS *	10	RECORD	20
DISC CHANGE	1	DOLBY B *	11	PREVIOUS / BACKWARD	21
OPEN / CLOSE	2	LOUDNESS	12	NEXT / FORWARD	22
DISC 1	3	PROG / REVERSE MODE	13	STOP	EXIT
DISC 2	4	CD	14	PLAY / PAUSE	24
DISC 3	5	TUNER	15	DISPLAY	25
POWER / STANDBY	6	TAPE	16	INCREDIBLE SURROUND	26
CLOCK / TIMER	7	AUX	17		
FLAT	8	PRESET / FREQUENCY	18		

* Not for all type/version.

Table 2


FM
INCREDIBLE SURROUND
FLAT
4KHz
8KHz

note1 : TUNER, AUX, Backlights (dimmed), INCREDIBLE SURROUND, LOUDNESS, CD2.

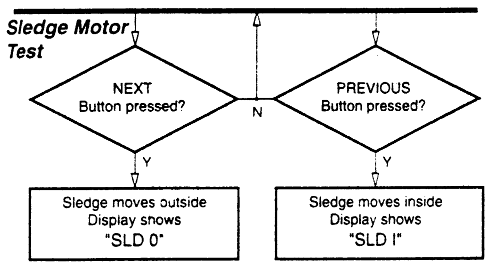
Figure 2

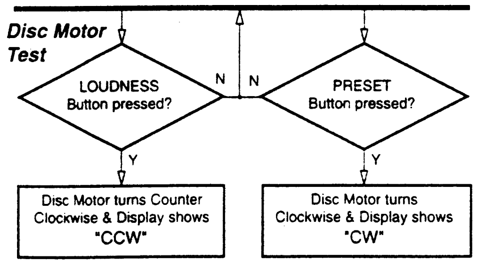
TEST	*Activated with*	*ACTION*
EEPROM TEST	FLAT STOP to Exit	A test pattern will be sent to the EEPROM. "PASS" is displayed if the uProcessor read back the test pattern correctly, otherwise "FAIL" will be displayed.
EEPROM FORMAT TEST	RECORD	Load default data. Display shows "NEW" for 1 second. ***Caution!*** ***All presets from the customer will be lost!!***
KEY TEST	NEXT STOP to Exit	Key numbers according Table 2 are shown on the display.
FAST CLOCK TEST	CLOCK/TIMER	The clock is switched to fast mode. "FAST" is displayed for 1 sec. Press CLOCK/TIMER again to reset the clock to normal. "NORMAL" displayed for 1 sec.
ADC TEST	AUX STOP to Exit	The display shows "ADC1_aa". Press AUX again to shows "ADC2_bb", "ADC3_cc" and "ADC4_dd" where "aa", "bb", "cc" and "dd" is the ADC value between 0 - 65 representing NTC, SA_1, SA_2 and SA_3 lines respectively.
ROTARY ENCODER TEST (For checking of Volume, Bass and Treble controls)	Volume Knob or Bass Knob or Treble Knob	Display shows value for 2 seconds. Value increases or decreases in steps of 1 until 0 (Min.) or 40 (Max.) is reached.
LEAVE SERVICE TESTPROGRAM	Disconnect mains cord	

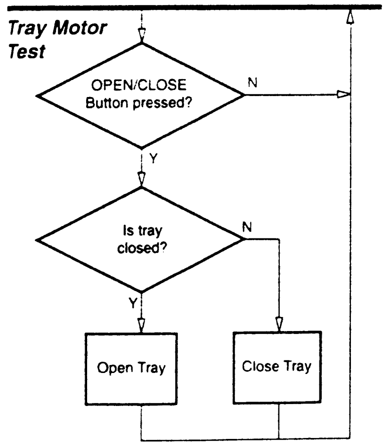
Error code	Type	Error Description
E1000	W	Focus Error Triggered when the focus could not be found within a certain time when starting up the CD or when the focus is lost for a certain time during play.
E1001	W	Radial Error Triggered when the radial servo is off-track for a certain time during play.
E1002	W	Sledge In Error The sledge did not reach its inner position (inner-switch is still close) before approximately 6 Sec. have passed. Inner-switch or sledge motor problem.
E1003	W	Sledge Out Error The sledge did not come out of its inner position (inner-switch is still open) before approximately 250 mSec. have passed by. Inner-switch or sledge motor problem.
E1005	W	Jump-offtrack error Triggered in normal play when the jump destination could not be found within a certain time.
E1006	W	Subcode Error (no subcode within time) Triggered when a new subcode was missing for a certain time during play.
E1007	W	PLL Error The Phase Lock Loop could not lock within a certain time.
E1008	W	Turntable Motor Error Generated when the CD could not reached 75% of speed during startup within a certain time. Disc motor problem.
E1020	F	Focus Search Error The focus point has not been found within a certain time.
E1070	W	The carousel switch is not open within a certain time. This can happen when either the switch is defective and closed all the time, or when the carousel is blocked when located exactly at a disc position.
E1071	W	The carousel position switch did not close within a certain time. This can happen when the switch is defective and never closes electrically, or when the carousel is blocked in between two disc positions. The time-out is approximately 5 Sec.
E1079	W	The drawer could not enter the inside position is opening again. This can be caused because the drawer is blocked by something and cannot go fully inside, or the drawer switch is defective and does not close.
E2020*	F	Head Movement Error Deck 1 Generated if the head does not reach the desired position within a certain time.
E2021*	F	Head Movement Error Deck 2 Generated if the head does not reach the desired position within a certain time.

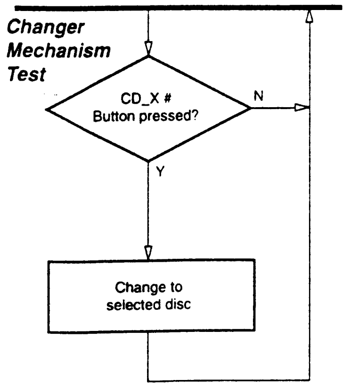
F = Fatal error & the set stop play function W = Warning
* For Logic set only.

Table 3


Sledge Motor Test
NEXT Button pressed?
PREVIOUS Button pressed?
N
Y
Y
Sledge moves outside Display shows "SLD 0"
Sledge moves inside Display shows "SLD I"

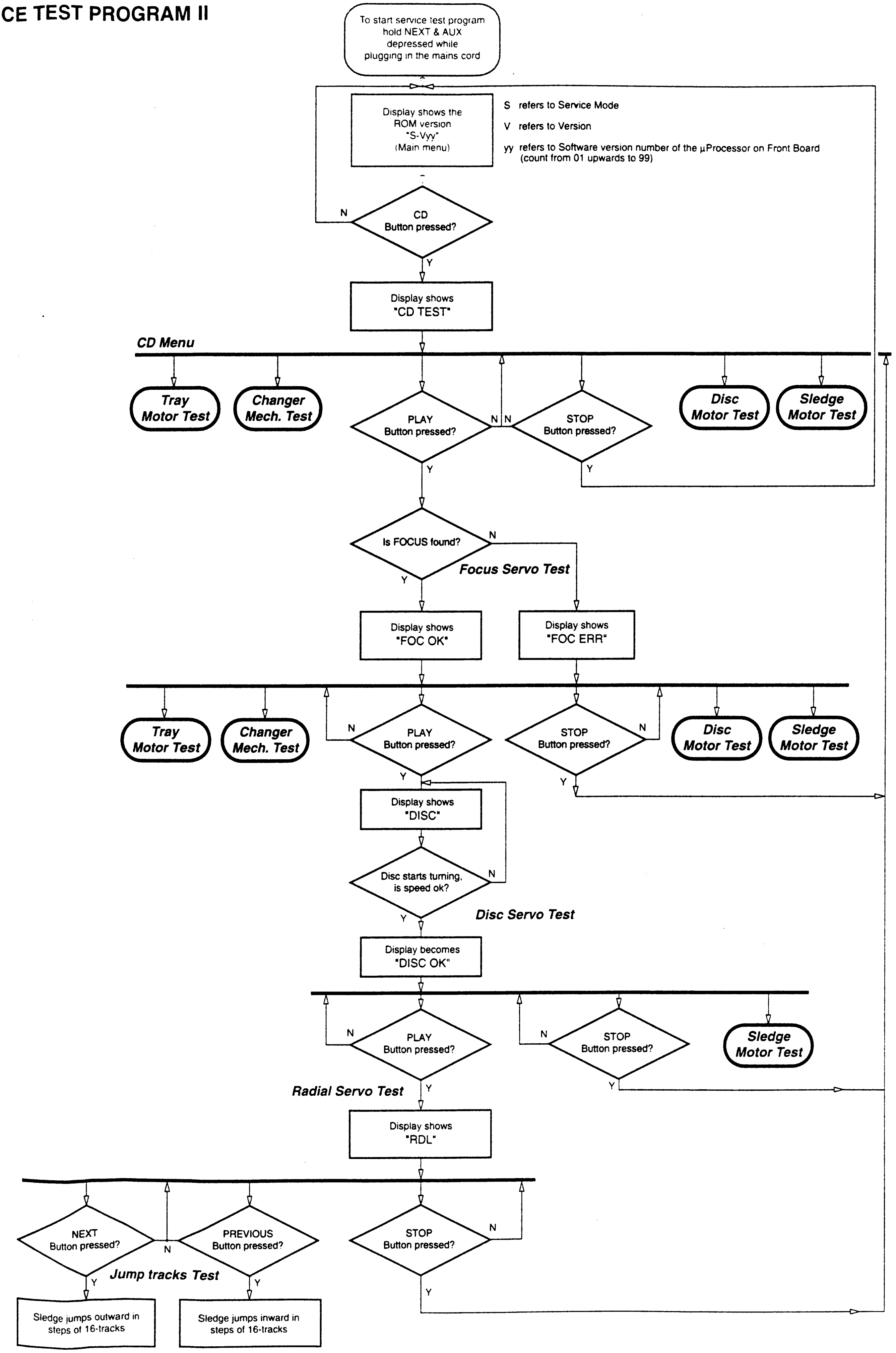

Disc Motor Test
LOUDNESS Button pressed?
PRESET Button pressed?
N
N
Y
Y
Disc Motor turns Counter Clockwise & Display shows "CCW"
Disc Motor turns Clockwise & Display shows "CW"


Tray Motor Test
OPEN/CLOSE Button pressed?
N
Y
Is tray closed?
N
Y
Open Tray
Close Tray


Changer Mechanism Test
CD_X # Button pressed?
N
Y
Change to selected disc

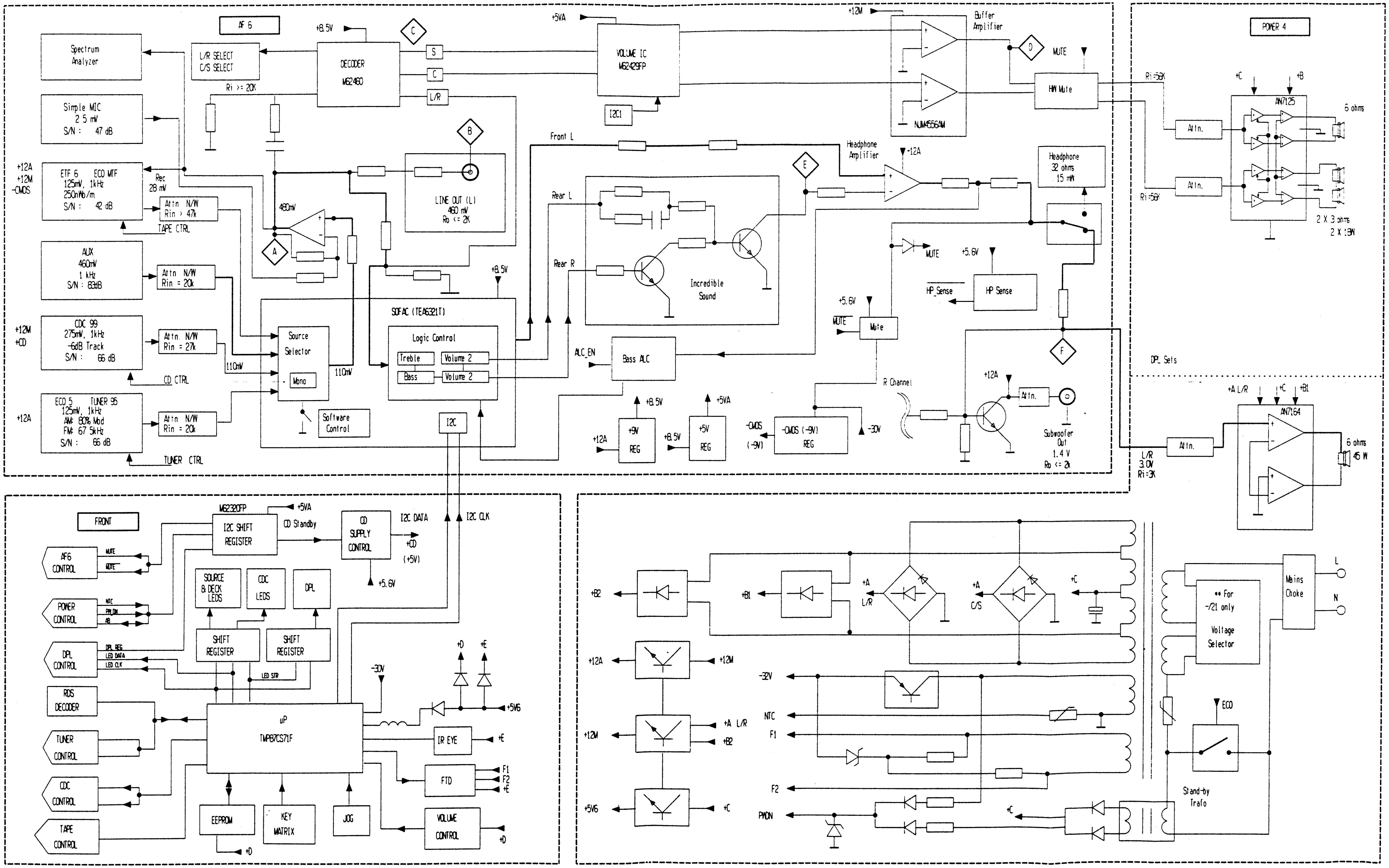
# CD_X refers to CD1, CD2 or CD3

SERVICE TEST PROGRAM II

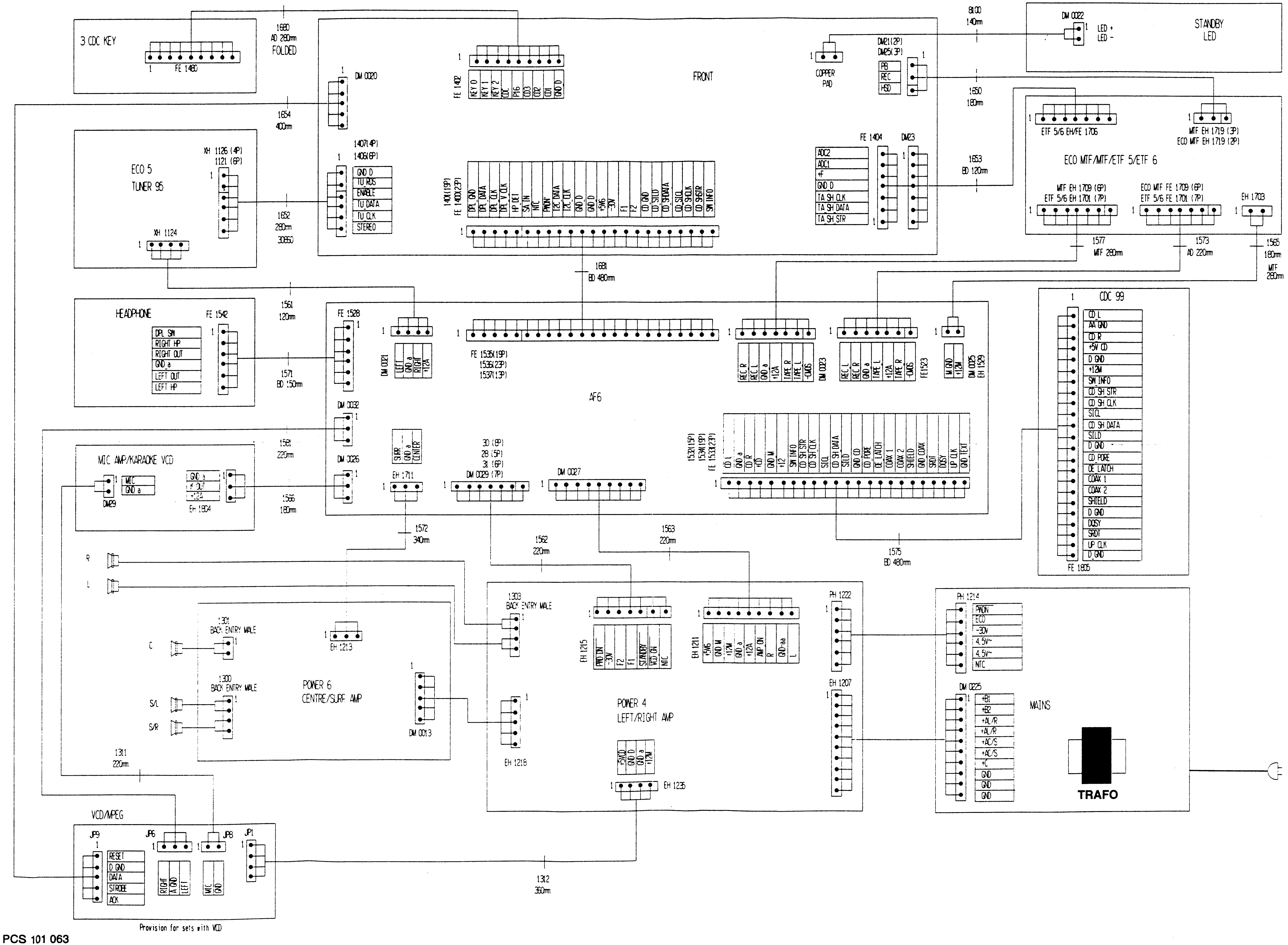

To start service test program hold NEXT & AUX depressed while plugging in the mains cord
Display shows the ROM version "S-Vyy" (Main menu)
CD Button pressed?
N
Y
Display shows "CD TEST"
CD Menu
Tray Motor Test
Changer Mech. Test
PLAY Button pressed?
N
N
STOP Button pressed?
Y
Y
Disc Motor Test
Sledge Motor Test
Is FOCUS found?
N
Y
Focus Servo Test
Display shows "FOC OK"
Display shows "FOC ERR"
Tray Motor Test
Changer Mech. Test
N
PLAY Button pressed?
STOP Button pressed?
N
Y
Y
Disc Motor Test
Sledge Motor Test
Display shows "DISC"
Disc starts turning, is speed ok?
N
Y
Disc Servo Test
Display becomes "DISC OK"
N
PLAY Button pressed?
N
STOP Button pressed?
Y
Sledge Motor Test
Radial Servo Test
Y
Display shows "RDL"
NEXT Button pressed?
N
PREVIOUS Button pressed?
STOP Button pressed?
N
Y
Jump tracks Test
Y
Y
Sledge jumps outward in steps of 16-tracks
Sledge jumps inward in steps of 16-tracks

S refers to Service Mode
V refers to Version
yy refers to Software version number of the µProcessor on Front Board (count from 01 upwards to 99)

SET BLOCK DIAGRAM


AF 6
Spectrum Analyzer
L/R SELECT
C/S SELECT
+8.5V
C
DECODER M62460
S
C
L/R
+5VA
VOLUME IC M62429FP
I2C1
+12M
Buffer Amplifier
NJM4556AM
D
MUTE
HW Mute
Ri >= 20K
Simple MIC 2.5 mV S/N : 47 dB
+12A +12M -CMOS
ETF 6 ECO MTF 125mV, 1kHz 250nWb/m S/N : 42 dB
Rec 28 mV
Attn N/W Rin > 47k
TAPE CTRL
460mV
A
B
LINE OUT (L) 460 mV Ro <= 2K
Front L
Rear L
Rear R
Incredible Sound
E
Headphone Amplifier
-12A
Headphone 32 ohms 15 mW
AUX 460mV 1 kHz S/N : 83dB
Attn N/W Rin = 20k
+8.5V
SOFAC (TEA6321T)
Logic Control
Treble
Bass
Volume 2
Volume 2
MUTE
+5.6V
HP Sense
HP Sense
+12M +CD
CDC 99 275mV, 1kHz -6dB Track S/N : 66 dB
Attn N/W Rin = 27k
CD CTRL
110mV
Source Selector
Mono
110mV
ALC_EN
Bass ALC
+5.6V
MUTE
Mute
F
+12A
ECO 5 TUNER 95 125mV, 1kHz AM: 80% Mod FM: 67.5kHz S/N : 66 dB
Attn N/W Rin = 20k
TUNER CTRL
Software Control
I2C
+8.5V
+5VA
+12A
+9V REG
+8.5V
+5V REG
-CMOS (-9V)
-CMOS (-9V) REG
-30V
R Channel
+12A
Attn.
Subwoofer Out 1.4 V Ro <= 2k
POWER 4
Ri=56K
+C
+B
AN7125
6 ohms
Attn.
Attn.
Ri=56K
2 X 3 ohms
2 X 13W
DPL Sets
+A L/R
+C
+B1
AN7164
L/R 3.0V Ri=3K
Attn.
6 ohms 45 W
FRONT
M62320FP
+5VA
I2C SHIFT REGISTER
CD Standby
CD SUPPLY CONTROL
+CD (+5V)
+5.6V
I2C DATA
I2C CLK
AF6 CONTROL
MUTE
MUTE
POWER CONTROL
NTC
PWON
AB
DPL CONTROL
DPL REG
LED DATA
LED CLK
SOURCE & DECK LEDS
CDC LEDS
DPL
SHIFT REGISTER
SHIFT REGISTER
LED STR
RDS DECODER
TUNER CONTROL
CDC CONTROL
TAPE CONTROL
uP TMP87CS71F
-30V
+D
+E
+5V6
IR EYE
+E
FTD
F1
F2
+E
EEPROM
+D
KEY MATRIX
JOG
VOLUME CONTROL
+D
+B2
+B1
+A L/R
+A C/S
+C
+12A
+12M
+12M
+A L/R
+B2
+5V6
+C
-32V
NTC
F1
F2
PWON
+C
L
N
Mains Choke
** For -/21 only Voltage Selector
ECO
Stand-by Trafo

SET WIRING DIAGRAM

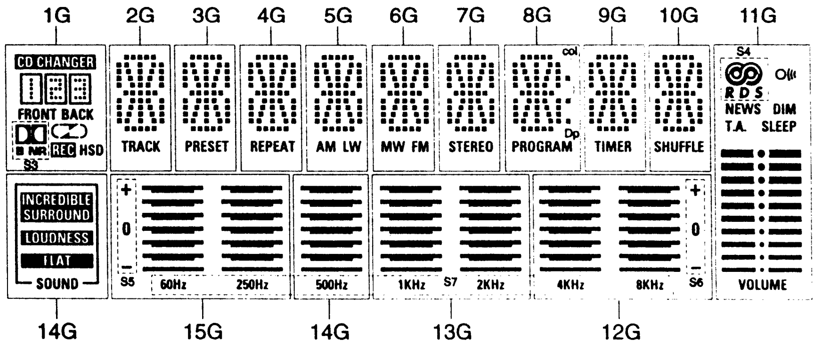

3 CDC KEY
1
FE 1480
1680
AD 280mm
FOLDED
FRONT
DM 0020
1
FE 1402
KEY 0
KEY 1
KEY 2
CDC
P16
CD3
CD2
CD1
GND D
1654
400mm
ECO 5
TUNER 95
XH 1126 (4P)
1121 (6P)
XH 1124
1652
280mm
30850
1407(4P)
1406(6P)
GND D
TU RDS
ENABLE
TU DATA
TU CLK
STEREO
1401(19P)
FE 1400(23P)
DPL_GND
DPL_DATA
DPL_CLK
DPL_V_CLK
HP DET
SA_IN
NTC
PWON
I2C_DATA
I2C_CLK
GND_D
GND_D
+5V6
-30V
F1
F2
CD_GND
CD_SILD
CD_SHDATA
CD_SICL
CD_SHCLK
CD_SHSTR
SW INFO
1681
BD 480mm
COPPER
PAD
DM21(2P)
DM25(3P)
PB
REC
HSD
FE 1404
DM23
ADC2
ADC1
+F
GND D
TA SH CLK
TA SH DATA
TA SH STR
8100
140mm
DM 0022
LED +
LED -
STANDBY
LED
1650
180mm
1653
BD 120mm
ETF 5/6 EH/FE 1706
MTF EH 1719 (3P)
ECO MTF EH 1719 (2P)
ECO MTF/MTF/ETF 5/ETF 6
MTF EH 1709 (6P)
ETF 5/6 EH 1701 (7P)
ECO MTF FE 1709 (6P)
ETF 5/6 FE 1701 (7P)
EH 1703
1577
MTF 280mm
1573
AD 220mm
1565
180mm
MTF
280mm
HEADPHONE
FE 1542
DPL SW
RIGHT HP
RIGHT OUT
GND_a
LEFT OUT
LEFT HP
1561
120mm
1571
BD 150mm
FE 1528
DM 0021
LEFT
GND a
RIGHT
+12A
FE 1535(19P)
1536(23P)
1537(13P)
AF6
REC R
REC L
GND a
+12A
TAPE R
TAPE L
-CMOS
DM 0023
REC L
REC R
GND a
TAPE L
+12A
TAPE R
-CMOS
FE1523
M GND
+12M
DM 0025
EH 1529
CDC 99
CD L
AA GND
CD R
+5V CD
D GND
+12M
SW INFO
CD SH STR
CD SH CLK
SICL
CD SH DATA
SILD
D_GND
CD_PORE
OE_LATCH
COAX 1
COAX 2
SHIELD
D GND
DOSY
SRDT
UP CLK
D_GND
FE 1805
DM 0032
1581
220mm
MIC AMP/KARAOKE VCD
MIC
GND a
DM29
GND a
K OUT
+12A
EH 1804
1566
180mm
DM 0026
SURR
GND a
CENTER
EH 1711
30 (8P)
28 (5P)
31 (6P)
DM 0029 (7P)
DM 0027
1532(15P)
1534(19P)
FE 1533(23P)
CD L
GND a
CD R
+CD
GND M
+12
SW INFO
CD SH STR
CD SH CLK
SICL
CD SH DATA
SILD
GND CD
CD PORE
OE LATCH
COAX 1
COAX 2
SHIELD
GND COAX
SRDT
DOSY
UP CLK
GND TEXT
1575
BD 480mm
1572
340mm
1562
220mm
1563
220mm
R
L
1303
BACK ENTRY MALE
1301
BACK ENTRY MALE
C
EH 1213
1300
BACK ENTRY MALE
S/L
S/R
POWER 6
CENTRE/SURF AMP
DM 0013
EH 1215
PWD ON
-30V
F2
F1
STANDBY
VCD ON
NTC
EH 1211
+5V6
GND M
+12M
GND a
+12A
AMP ON
R
GND-aa
L
PH 1222
EH 1207
EH 1218
POWER 4
LEFT/RIGHT AMP
+5VCD
GND D
GND a
+12M
EH 1235
PH 1214
PWON
ECO
-30V
4.5V~
4.5V~
NTC
DM 0225
+B1
+B2
+AL/R
+AL/R
+AC/S
+AC/S
+C
GND
GND
GND
MAINS
TRAFO
1311
220mm
VCD/MPEG
JP9
RESET
D GND
DATA
STROBE
ACK
JP6
RIGHT
A GND
LEFT
JP8
MIC
GND
JP1
1312
360mm
Provision for sets with VCD

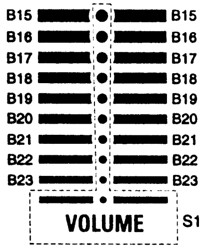
FRONT BOARD

TABLE OF CONTENTS

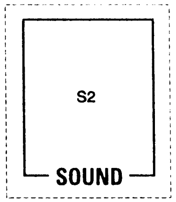
LCD pin connection 6-1
Front Board - Component and Chip layouts 6-2
Front Board - Circuit diagram & Variations table 6-3
Key-CDC part - Layouts & Circuit diagram 6-4
Electrical parts list 6-5

FTD DISPLAY PIN CONNECTIONS

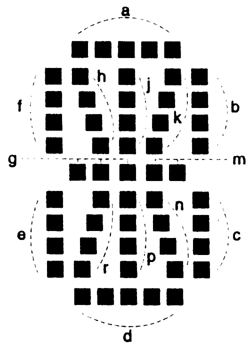

1G
2G
3G
4G
5G
6G
7G
8G
9G
10G
11G
CD CHANGER
FRONT BACK
B NR REC HSD
S3
TRACK
PRESET
REPEAT
AM LW
MW FM
STEREO
col
Dp
PROGRAM
TIMER
SHUFFLE
S4
RDS
NEWS DIM
T.A. SLEEP
INCREDIBLE SURROUND
LOUDNESS
FLAT
SOUND
+
0
–
S5
60Hz
250Hz
500Hz
1KHz
S7
2KHz
4KHz
8KHz
S6
VOLUME
14G
15G
14G
13G
12G


B15
B16
B17
B18
B19
B20
B21
B22
B23
VOLUME
S1

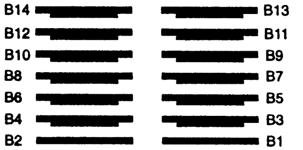
(11G)



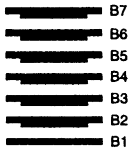
(14G)


a
h
j
k
f
b
g
m
n
e
c
r
p
d

(2G~10G)


B14
B12
B10
B8
B6
B4
B2
B13
B11
B9
B7
B5
B3
B1

(12G , 13G , 15G)

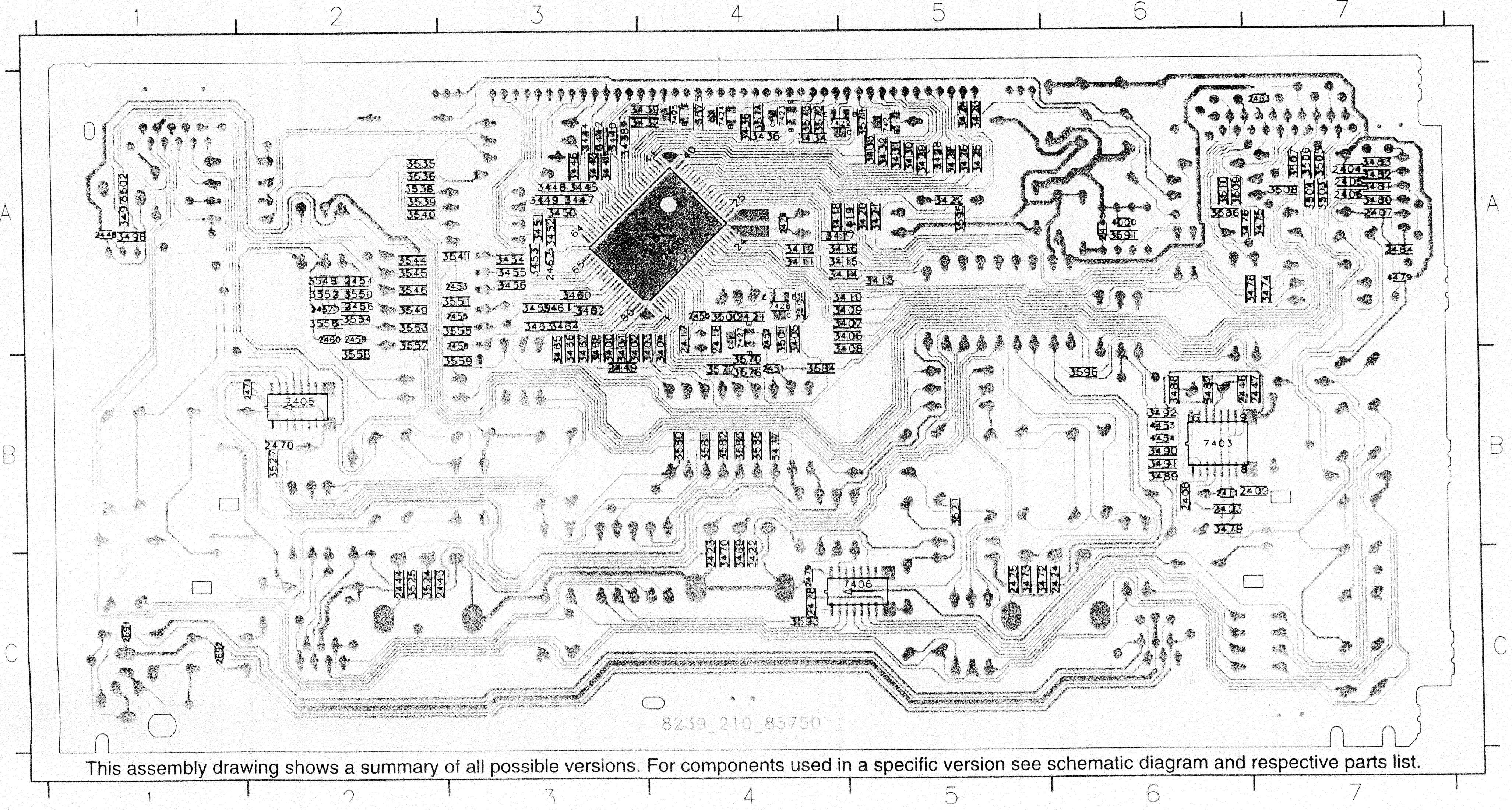

B7
B6
B5
B4
B3
B2
B1

(14G)

	15G	14G	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	B1	B1	B1	B1	S4	a	a	a	a	a	a	a	a	a	CD CHANGER
P2	B2	B2	B2	B2	O(((	h	h	h	h	h	h	n	h	h	⋮
P3	B3	B3	B3	B3	DIM	j , p	j , p	j , p	j , p	j , p	j , p	j , p	j , p	j , p	▯ (1)
P4	B4	B4	B4	B4	NEWS	k	k	k	k	k	k	k	k	k	⁞
P5	B5	B5	B5	B5	T.A.	b	b	b	b	b	b	b	b	b	▯ (2)
P6	B6	B6	B6	B6	SLEEP	f	f	f	f	f	f	f	f	f	⁞
P7	B7	B7	B7	B7	B15	m	m	m	m	m	m	m	m	m	▯ (3)
P8	B8	S7	B8	B8	B16	g	g	g	g	g	g	g	g	g	BACK
P9	B9	-	B9	B9	B17	c	c	c	c	c	c	c	c	c	FRONT
P10	B10	-	B10	B10	B18	e	e	e	e	e	e	e	e	e	S3
P11	B11	-	B11	B11	B19	r	r	r	r	r	r	r	r	r	(
P12	B12	S2	B12	B12	B20	n	n	n	n	n	n	n	n	n	⇄
P13	B13	INCREDIBLE SURROUND	B13	B13	B21	d	d	d	d	d	d	d	d	d	)
P14	B14	LOUDNESS	B14	B14	B22	SHUFFLE	TIMER	PROGRAM	STEREO	MW	AM	REPEAT	PRESET	TRACK	REC
P15	S7	FLAT	S7	S7	B23	-	-	col	-	FM	LW	-	-	-	HSD
P16	S5	-	-	S6	S1	-	-	Dp	-	-	-	-	-	-	-

FRONT BOARD - CHIP LAYOUT

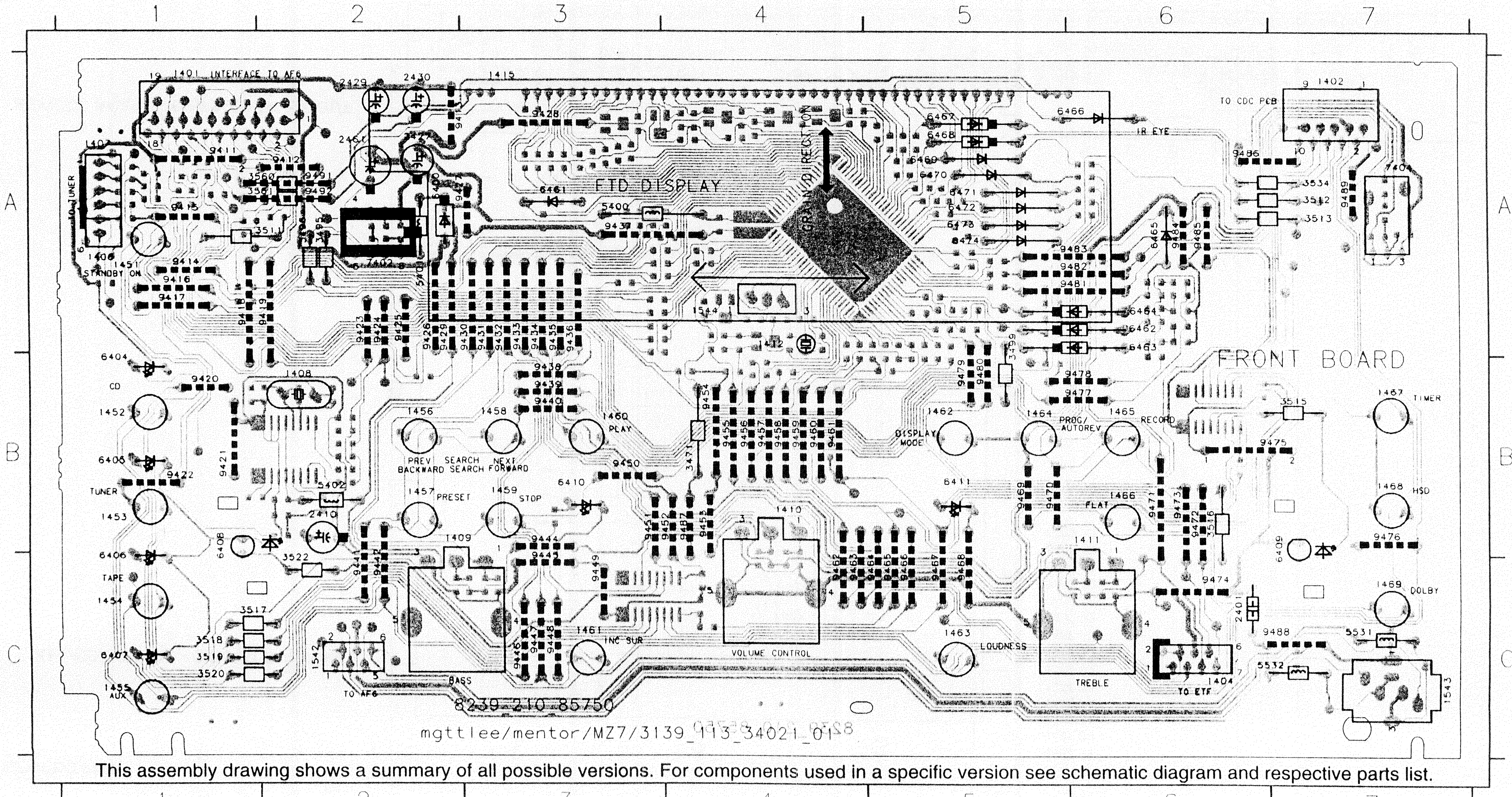
2403	B6	2422	C4	2449	B3	2460	A2	3401	A3	3412	A4	3423	A5	3434	A4	3445	A3	3456	A3	3469	C4	3481	A7	3498	A1	3510	A6	3544	A2	3556	A2	3579	B4	3596	B6	7423	A4
2404	A7	2423	C4	2450	A4	2462	A3	3402	A3	3413	A5	3424	A5	3435	A4	3446	A3	3459	A3	3470	C4	3482	A7	3500	A4	3521	B5	3545	A2	3557	A2	3580	B4	4000	A6	7424	A4
2405	A7	2424	C6	2451	B4	2463	A7	3403	A4	3414	A5	3425	A5	3436	A4	3447	A3	3460	A3	3472	C5	3483	A7	3501	A4	3524	C2	3546	A2	3558	B2	3581	B4	4453	B6	7425	A4
2406	A7	2425	C5	2452	A4	2464	A7	3404	A4	3415	A5	3426	A5	3437	A4	3448	A3	3461	A3	3473	C5	3487	B6	3502	A1	3525	C2	3548	A2	3559	B3	3582	B4	4454	B6	7427	A4
2407	A7	2426	A4	2453	A3	2470	B2	3405	A4	3416	A5	3427	A5	3438	A3	3449	A3	3462	A3	3474	A7	3488	B6	3503	A7	3527	B2	3549	A2	3571	A5	3583	B4	4479	A7	7428	A4
2408	B6	2443	C2	2454	A2	2471	B2	3406	A5	3417	A4	3428	A5	3439	A4	3450	A3	3463	A3	3475	A7	3489	B6	3504	A7	3535	A2	3550	A2	3572	A4	3584	B4	7400	A4		
2409	B7	2444	C2	2455	A3	2478	C4	3407	A5	3418	A4	3429	A5	3440	A3	3451	A3	3464	A3	3476	A7	3490	B6	3505	A7	3536	A2	3551	A3	3573	A4	3585	B4	7403	B6		
2411	B6	2445	A6	2456	A2	2479	C4	3408	A5	3419	A5	3430	A5	3441	A3	3452	A3	3465	A3	3477	B4	3491	B6	3506	A7	3538	A2	3552	A2	3574	A4	3586	A6	7405	B2		
2417	A4	2446	B6	2457	A2	2691	C1	3409	A5	3420	A5	3431	A5	3442	A3	3453	A3	3466	A3	3478	A7	3492	B6	3507	A7	3539	A2	3553	A2	3575	A4	3591	A6	7406	C5		
2418	A4	2447	B7	2458	A3	2692	C1	3410	A5	3421	A5	3432	A5	3443	A3	3454	A3	3467	A3	3479	B6	3494	A4	3508	A7	3540	A2	3554	A2	3576	B4	3593	C4	7421	A5		
2421	A4	2448	A1	2459	A2	3400	A3	3411	A4	3422	A5	3433	A5	3444	A3	3455	A3	3468	A3	3480	A7	3497	A1	3509	A6	3541	A3	3555	A3	3577	B4	3595	A5	7422	A5		



This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

FRONT BOARD - COMPONENT LAYOUT

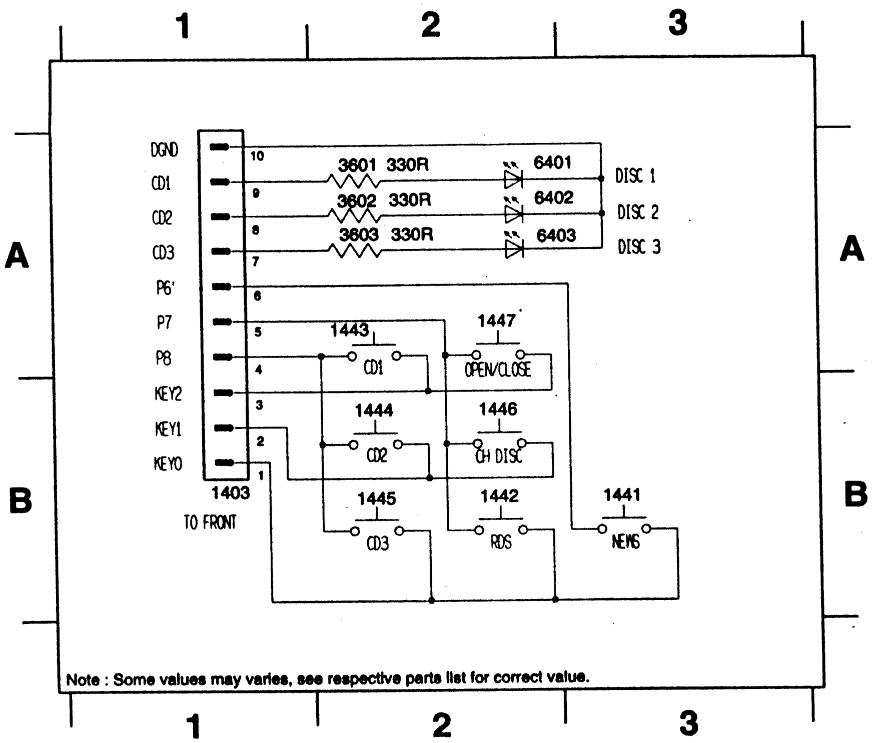
1401	A1
1402	A7
1404	C6
1406	A1
1407	A1
1408	B2
1409	B2
1410	B4
1411	B6
1412	A4
1415	A3
1451	A1
1452	B1
1453	B1
1454	C1
1455	C1
1456	B2
1457	B2
1458	B3
1459	B3
1460	B3
1461	C3
1462	B5
1463	C5
1464	B5
1465	B6
1466	B6
1467	B7
1468	B7
1469	C7
1542	C2
1543	C7
1544	A4
2401	C6
2410	B2
2427	A2
2429	A2
2430	A2
2461	A2
3471	B4
3495	A2
3496	A2
3499	A5
3511	A2
3512	A7
3513	A7
3515	B7
3516	B6
3517	C1
3518	C1
3519	C1
3520	C1
3522	C2
3534	A7
3560	A2
3561	A2
5400	A3
5401	A2
5402	B2
5531	C7
5532	C7
6400	A2
6404	B1
6405	B1
6406	C1
6407	C1
6408	B1
6409	B7
6410	B3
6411	B5
6461	A3
6462	A6
6463	A6
6464	A6
6465	A6
6466	A6
6467	A5
6468	A5
6469	A5
6470	A5
6471	A5
6472	A5
6473	A5
6474	A5
7402	A2
7404	A7
9411	A1
9412	A2
9413	A2
9414	A1
9415	A1
9416	A1
9417	A1
9418	A1
9419	A2
9420	B1
9421	B1
9422	B1
9423	A2
9424	A2
9425	A2
9426	A2
9427	A2
9428	A3
9429	A2
9430	A3
9431	A3
9432	A3
9433	A3
9434	A3
9435	A3
9436	A3
9437	A3
9438	B3
9439	B3
9440	B3
9441	C2
9442	C2
9444	B3
9445	C3
9446	C3
9447	C3
9448	C3
9449	C3
9450	B3
9451	B3
9452	B4
9453	B4
9454	B4
9455	B4
9456	B4
9457	B4
9458	B4
9459	B4
9460	B4
9461	B4
9462	C4
9463	C4
9464	C5
9465	C5
9466	C5
9467	C5
9468	C5
9469	B5
9470	B5
9471	B6
9472	B6
9473	B6
9474	C6
9475	B7
9476	B7
9477	B6
9478	B6
9479	B5
9480	B5
9481	A6
9482	A6
9483	A6
9484	A6
9485	A6
9486	A6
9487	B4
9488	C7
9489	A7
9491	A2
9492	A2


1
2
3
4
5
6
7
A
B
C
1401 INTERFACE TO AF6
TO TUNER
STANDBY ON
FTD DISPLAY
GRAIN DIRECTION
TO CDC PCB
IR EYE
FRONT BOARD
CD
TUNER
TAPE
AUX
PREV BACKWARD
SEARCH SEARCH
NEXT FORWARD
PRESET
STOP
PLAY
INC SUR
BASS
VOLUME CONTROL
DISPLAY MODE
PROG/AUTOREV
RECORD
FLAT
LOUDNESS
TREBLE
TIMER
HSD
DOLBY
TO AF6
TO ETF
8239 210 85750
mgttlee/mentor/MZ7/3139_113_34021_01

This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

KEY-CDC PART

KEY-CDC BOARD - CIRCUIT DIAGRAM

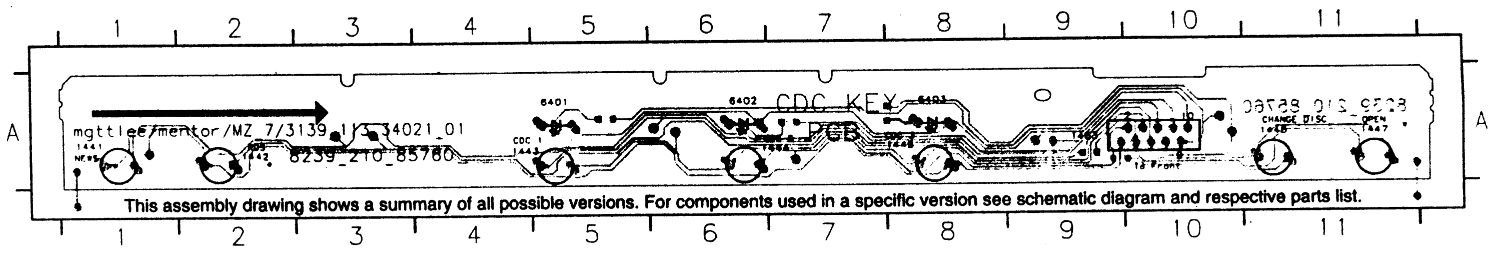

1
2
3
A
B
DGND
CD1
CD2
CD3
P6'
P7
P8
KEY2
KEY1
KEY0
10
9
8
7
6
5
4
3
2
1
1403
TO FRONT
3601 330R
3602 330R
3603 330R
6401
6402
6403
DISC 1
DISC 2
DISC 3
1443
CD1
1447
OPEN/CLOSE
1444
CD2
1446
CH DISC
1445
CD3
1442
RDS
1441
NEWS

Note : Some values may varies, see respective parts list for correct value.

1403	B1
1441	B3
1442	B2
1443	A2
1444	B2
1445	B2
1446	B2
1447	A2
3601	A2
3602	A2
3603	A2
6401	A2
6402	A2
6403	A2

KEY-CDC BOARD - COMPONENT LAYOUT

1403 A9	1441 A1	1442 A2	1443 A4	1444 A7	1445 A8	1446 A11	1447 A11	6401 A5	6402 A6	6403 A8


1
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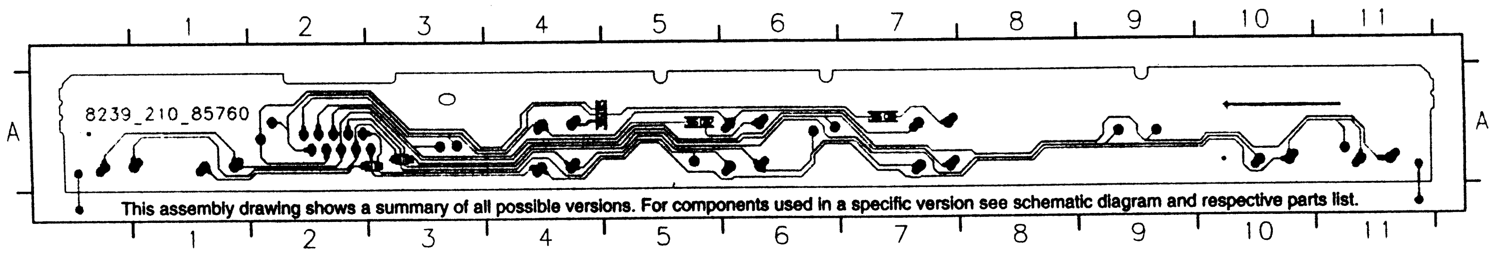
7
8
9
10
11
A
mgttlee/mentor/MZ_7/3139_113_34021_01
8239_210_85760
CDC KEY PCB
1441 NEWS
1442 RDS
CDC 1 1443
6401
6402
6403
1444
1445
1403
To Front
CHANGE DISC 1446
OPEN 1447

This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

KEY-CDC BOARD - CHIP LAYOUT

3601 A7	3602 A5	3603 A4	4411 A3	4412 A3


1
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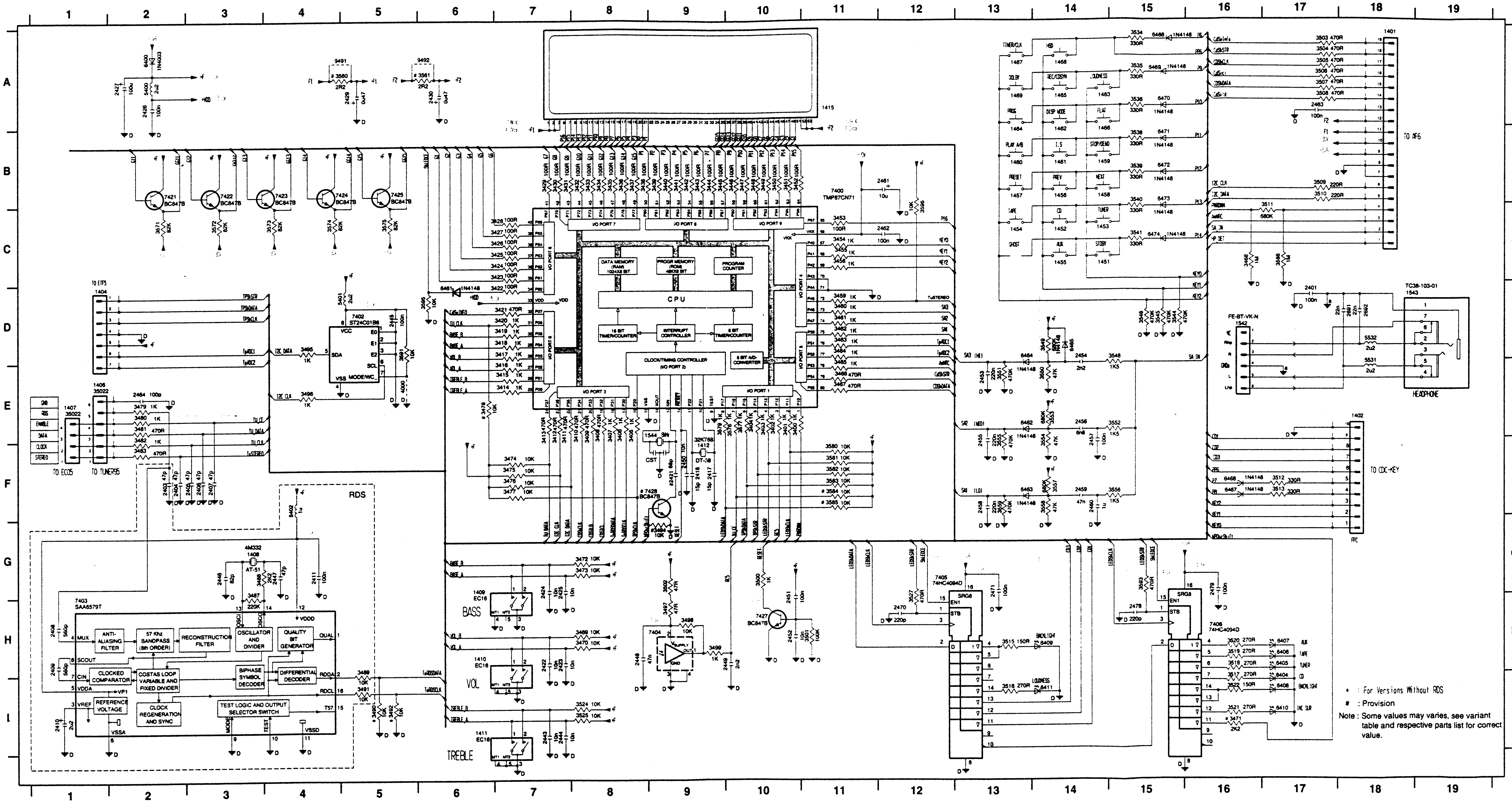
11
A
8239_210_85760

This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

FRONT BOARD - CIRCUIT DIAGRAM

1401 A18
1402 E18
1404 D1
1406 E1
1407 E1
1408 G3
1409 G6
1410 H6
1411 I6
1412 F9
1415 A11
1451 C14
1452 C14
1453 C14
1454 C13
1455 C14
1456 B14
1457 B13
1458 B14
1459 B14
1460 B13
1461 B14
1462 B14
1463 A14
1464 B13
1465 A14
1466 B14
1467 A13
1468 A14
1469 A13
1542 D16
1543 D18
1544 E9
2401 D17
2403 F2
2404 F2
2405 F3
2406 F3
2407 F3
2408 H1
2409 H1
2410 I1
2411 G4
2417 F9
2418 F9
2421 F9
2422 H7
2423 H7
2424 G7
2425 G7
2426 A2
2427 A2
2429 A5
2430 A6
2443 I7
2444 I7
2445 D6
2446 G3
2447 G4
2448 H8
2449 H10
2450 F9
2451 H10
2452 H10
2453 E13
2454 D14
2455 F13
2456 E14
2457 F14
2458 F13
2459 F14
2460 F14
2461 B12
2462 C12
2463 A17
2464 E2
2470 H12
2471 G13
2478 H15
2479 G16
2891 D18
2892 D18
3400 E10
3401 E10
3402 E10
3403 E10
3404 E10
3405 E8
3406 E8
3407 E8
3408 E8
3409 E8
3410 E8
3411 E7
3412 E7
3413 E7
3414 E7
3415 E7
3416 E7
3417 D7
3418 D7
3419 D7
3420 D7
3421 D7
3422 D7
3423 C7
3424 C7
3425 C7
3426 C7
3427 C7
3428 C7
3429 B7
3430 B7
3431 B7
3432 B8
3433 B8
3434 B8
3435 B8
3436 B8
3437 B8
3438 B8
3439 B9
3440 B9
3441 B9
3442 B9
3443 B9
3444 B9
3445 B9
3446 B10
3447 B10
3448 B10
3449 B10
3450 B10
3451 B10
3452 B10
3453 C11
3454 C11
3455 C11
3456 C11
3459 D11
3460 D11
3461 D11
3462 D11
3463 D11
3464 D11
3465 D11
3466 E11
3467 E11
3468 C16
3469 H8
3470 H8
3471 I16
3472 G8
3473 G8
3474 F7
3475 F7
3476 F7
3477 F7
3478 E6
3479 E2
3480 E2
3481 E2
3482 E2
3483 F2
3487 G3
3488 G3
3489 H5
3490 I5
3491 I5
3492 I5
3494 G9
3495 D4
3496 E4
3497 H9
3498 H9
3499 H9
3500 G10
3501 H11
3502 G9
3503 A17
3504 A17
3505 A17
3506 A17
3507 A17
3508 A17
3509 B17
3510 B17
3511 C17
3512 F17
3513 F17
3515 H13
3516 I13
3517 H16
3518 H16
3519 H16
3520 H16
3521 I16
3522 I16
3524 I8
3525 I8
3527 H12
3534 A15
3535 A15
3536 A15
3538 B15
3539 B15
3540 B15
3541 C15
3544 D15
3545 D15
3546 D15
3548 D15
3549 D14
3550 E14
3551 E13
3552 E15
3553 E14
3554 F14
3555 F13
3556 F15
3557 F14
3558 F14
3559 F13
3560 A5
3561 A6
3571 C2
3572 C3
3573 C4
3574 C4
3575 C5
3576 E10
3577 E10
3579 E9
3580 F11
3581 F11
3582 F11
3583 F11
3584 F11
3585 F11
3586 C17
3591 D5
3593 G15
3595 D6
3596 C12
4000 E5
5400 A2
5401 D6
5402 F4
5531 E18
5532 D18
6400 A2
6404 I17
6405 H17
6406 H17
6407 H17
6408 I17
6409 H14
6410 I17
6411 I14
6461 D6
6462 E13
6463 F13
6464 D13
6465 D14
6466 A15
6467 F16
6468 F16
6469 A15
6470 A15
6471 B15
6472 B15
6473 B15
6474 C15
7400 B11
7402 D5
7403 H1
7404 H9
7405 G12
7406 H16
7421 B2
7422 B3
7423 B4
7424 B4
7425 B6
7427 H10
7428 F8
9491 A5
9492 A6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19
A
B
C
D
E
F
G
H
I
1415
7400
TMP87CN71
DATA MEMORY (RAM) 1024X8 BIT
PROGR MEMORY (ROM) 48KX8 BIT
PROGRAM COUNTER
CPU
16 BIT TIMER/COUNTER
INTERRUPT CONTROLLER
8 BIT TIMER/COUNTER
CLOCK/TIMING CONTROLLER (I/O PORT 2)
8 BIT A/D-CONVERTER
I/O PORT 7
I/O PORT 8
I/O PORT 9
I/O PORT 6
I/O PORT 5
I/O PORT 4
I/O PORT 3
I/O PORT 1
7421 BC847B
7422 BC847B
7423 BC847B
7424 BC847B
7425 BC847B
7402 ST24C01B6
VCC
SDA
SCL
VSS
MODE/WC
E0
E1
E2
I2C DATA
I2C CLK
TO ETF5
1404
1406 35022
1407 35022
GND
RDS
ENABLE
DATA
CLOCK
STEREO
TO EC05
TO TUNER95
TU CE
TU DATA
TU CLK
TuSTEREO
RDS
7403 SAA6579T
ANTI-ALIASING FILTER
57 Khz BANDPASS (8th ORDER)
RECONSTRUCTION FILTER
OSCILLATOR AND DIVIDER
QUALITY BIT GENERATOR
CLOCKED COMPARATOR
COSTAS LOOP VARIABLE AND FIXED DIVIDER
BIPHASE SYMBOL DECODER
DIFFERENTIAL DECODER
REFERENCE VOLTAGE
CLOCK REGENERATION AND SYNC
TEST LOGIC AND OUTPUT SELECTOR SWITCH
MUX
SCOUT
CIN
VDDA
VREF
VSSA
VDDD
VSSD
QUAL
RDDA
RDCL
T57
MODE
TEST
4M332
1408
AT-51
1409 EC16
BASS
1410 EC16
VOL
1411 EC16
TREBLE
7404
7427 BC847B
7428 BC847B
1544
CST
1412
32K768
DT-38
7405 74HC4094D
7406 74HC4094D
SRG8
EN1
STB
BACKLIGHT
LOUDNESS
AUX
TAPE
TUNER
CD
INC SUR
TIMER/CLK
HSD
DOLBY
REC/CDSYN
LOUDNESS
PROG
DISP MODE
FLAT
PLAY A/B
I.S
STOP/DEMO
PRESET
PREV
NEXT
TAPE
CD
TUNER
GHOST
AUX
STDBY
1401
TO AF6
1402
TO CDC-KEY
FE-BT-VK-N
1542
TC38-103-01
1543
HEADPHONE
SA IN
SA3
SA2
SA1
KEY0
KEY1
KEY2
1N4148
BC847B

- * : For Versions Without RDS
- # : Provision

Note : Some values may varies, see variant table and respective parts list for correct value.

Variations table for Front Board

	MZ7/22	MZ7/37
1406	X	-
1407	-	X
1408	X	-
2403	47pF	-
2408	560pF	-

	MZ7/22	MZ7/37
2409	560pF	-
2410	2,2µF	-
2411	100nF	-
2446	82pF	-
2447	47pF	-

	MZ7/22	MZ7/37
2464	100pF	-
3469	10k	-
3479	1k	-
3487	220k	-
3488	2k2	-

	MZ7/22	MZ7/37
3490	-	10k
3491	10k	-
3492	-	10k
5402	X	-
7403	X	-

X = Item in use.

MISCELLANEOUS

1401	482226511545	Flex Connector 19P
1402	482226511208	Flex Connector 10P
1403	482226710729	Flex Connector 10P
1404	482226710953	Flex Connector 7P
1408	482224272195	QUARZ 4,332 MHz
1409	482227310366	Rotary Encoder 24P
1410	482227310365	Rotary Encoder 24P
1411	482227310366	Rotary Encoder 24P
1412	242254301069	RES XTL 32kHZ768
1415	313911051960	FTD Display
1441	482227613775	Tact Switch
1442	482227613775	Tact Switch
1443	482227613775	Tact Switch
1444	482227613775	Tact Switch
1445	482227613775	Tact Switch
1446	482227613775	Tact Switch
1447	482227613775	Tact Switch
1451	482227613775	Tact Switch
1452	482227613775	Tact Switch
1453	482227613775	Tact Switch
1454	482227613775	Tact Switch
1455	482227613775	Tact Switch
1456	482227613775	Tact Switch
1457	482227613775	Tact Switch
1458	482227613775	Tact Switch
1459	482227613775	Tact Switch
1460	482227613775	Tact Switch
1461	482227613775	Tact Switch
1462	482227613775	Tact Switch
1463	482227613775	Tact Switch
1464	482227613775	Tact Switch
1465	482227613775	Tact Switch
1466	482227613775	Tact Switch
1467	482227613775	Tact Switch
1468	482227613775	Tact Switch
1469	482227613775	Tact Switch
1542	482226710731	Flex Connector 6P
1543	242202605059	Headphone Socket
1544	482224272066	Ceramic Resonator 8MHz

CAPACITORS

2401	482212613838	100nF +80/-20% 50V
2403	482212613692	47pF 1% 63V
2404	482212613692	47pF 1% 63V
2405	482212613692	47pF 1% 63V
2406	482212613692	47pF 1% 63V
2407	482212613692	47pF 1% 63V
2408	482212233173	560pF 10% 50V
2409	482212233173	560pF 10% 50V
2410	482212422652	2,2µF 20% 50V
2411	482212614585	100nF 10% 50V
2417	482212613486	15pF 2% 63V
2418	482212613486	15pF 2% 63V
2422	482212233177	10nF 20% 50V
2423	482212233177	10nF 20% 50V
2424	482212233177	10nF 20% 50V
2425	482212233177	10nF 20% 50V
2426	482212613838	100nF +80/-20% 50V
2427	482212442234	100µF 20% 6,3V
2429	532212441948	470nF 20% 50V
2430	532212441948	470nF 20% 50V
2443	482212233177	10nF 20% 50V
2444	482212233177	10nF 20% 50V
2445	482212614585	100nF 10% 50V
2446	482212613695	82pF 1% 63V
2447	482212613692	47pF 1% 63V
2448	482212613751	47nF 10% 63V
2449	482212233127	2,2nF 10% 63V
2450	532212234098	10nF 10% 63V
2451	482212614585	100nF 10% 50V
2452	532212234098	10nF 10% 63V
2453	482212614076	220nF +80/-20% 25V
2454	482212233127	2,2nF 10% 63V
2455	482212614076	220nF +80/-20% 25V
2456	532212231866	6,8nF 10% 63V
2457	482212614585	100nF 10% 50V
2458	482212614076	220nF +80/-20% 25V
2459	482212613751	47nF 10% 63V
2460	482212614043	1µF +80/-20% 16V
2461	482212412255	10µF 20% 50V
2462	482212613838	100nF +80/-20% 50V
2463	482212614585	100nF 10% 50V
2464	532212232531	100pF 5% 50V
2470	482212233575	220pF 5% 63V
2471	482212614585	100nF 10% 50V
2478	482212233575	220pF 5% 63V
2479	482212614585	100nF 10% 50V
2691	532212232654	22nF 10% 63V
2692	532212232654	22nF 10% 63V

RESISTORS

3400	482205110102	1k 2% 0,25W
3401	482205110102	1k 2% 0,25W
3402	482205110102	1k 2% 0,25W
3403	482205110102	1k 2% 0,25W
3404	482205110102	1k 2% 0,25W
3405	482205110102	1k 2% 0,25W
3406	482205110102	1k 2% 0,25W
3407	482205110102	1k 2% 0,25W
3408	482205120471	470R 5% 0,1W
3409	482205120471	470R 5% 0,1W
3410	482205120471	470R 5% 0,1W
3411	482205120471	470R 5% 0,1W
3412	482205120471	470R 5% 0,1W
3413	482205120471	470R 5% 0,1W
3414	482205110102	1k 2% 0,25W
3415	482205110102	1k 2% 0,25W
3416	482205110102	1k 2% 0,25W
3417	482205110102	1k 2% 0,25W
3418	482205110102	1k 2% 0,25W
3419	482205110102	1k 2% 0,25W
3420	482205110102	1k 2% 0,25W
3421	482205120471	470R 5% 0,1W
3422	482205120101	100R 5% 0,1W
3423	482205120101	100R 5% 0,1W
3424	482205120101	100R 5% 0,1W
3425	482205120101	100R 5% 0,1W
3426	482205120101	100R 5% 0,1W
3427	482205120101	100R 5% 0,1W
3428	482205120101	100R 5% 0,1W
3429	482205120101	100R 5% 0,1W
3430	482205120101	100R 5% 0,1W
3431	482205120101	100R 5% 0,1W
3432	482205120101	100R 5% 0,1W
3433	482205120101	100R 5% 0,1W
3434	482205120101	100R 5% 0,1W
3435	482205120101	100R 5% 0,1W
3436	482205120101	100R 5% 0,1W
3437	482205120101	100R 5% 0,1W
3438	482205120101	100R 5% 0,1W
3439	482205120101	100R 5% 0,1W
3440	482205120101	100R 5% 0,1W
3441	482205120101	100R 5% 0,1W
3442	482205120101	100R 5% 0,1W
3443	482205120101	100R 5% 0,1W
3444	482205120101	100R 5% 0,1W
3445	482205120101	100R 5% 0,1W
3446	482205120101	100R 5% 0,1W
3447	482205120101	100R 5% 0,1W
3448	482205120101	100R 5% 0,1W
3449	482205120101	100R 5% 0,1W
3450	482205120101	100R 5% 0,1W
3451	482205120101	100R 5% 0,1W
3452	482205120101	100R 5% 0,1W
3453	482205120101	100R 5% 0,1W
3454	482205110102	1k 2% 0,25W
3455	482205110102	1k 2% 0,25W
3456	482205110102	1k 2% 0,25W
3459	482205110102	1k 2% 0,25W
3460	482205110102	1k 2% 0,25W
3461	482205110102	1k 2% 0,25W
3462	482205110102	1k 2% 0,25W
3463	482205110102	1k 2% 0,25W
3464	482205110102	1k 2% 0,25W
3465	482205110102	1k 2% 0,25W
3466	482205120471	470R 5% 0,1W
3467	482205120471	470R 5% 0,1W
3468	482205120105	1M 5% 0,1W
3469	482211710833	10k 1% 0,1W
3470	482211710833	10k 1% 0,1W
3472	482211710833	10k 1% 0,1W
3473	482211710833	10k 1% 0,1W
3474	482211710833	10k 1% 0,1W
3475	482211710833	10k 1% 0,1W
3476	482211710833	10k 1% 0,1W
3477	482211710833	10k 1% 0,1W
3479	482205110102	1k 2% 0,25W
3480	482205110102	1k 2% 0,25W
3481	482205120471	470R 5% 0,1W
3482	482205110102	1k 2% 0,25W
3483	482205120471	470R 5% 0,1W
3487	482211713579	220k 1% 0,1W
3488	482211711449	2k2 1% 0,1W
3489	482211710833	10k 1% 0,1W
3490	482211710833	10k 1% 0,1W
3491	482211710833	10k 1% 0,1W
3492	482211710833	10k 1% 0,1W
3495	482205011002	1k 1% 0,4W
3496	482205011002	1k 1% 0,4W
3497	482205120479	47R 5% 0,1W
3498	482211710833	10k 1% 0,1W
3499	482205011002	1k 1% 0,4W
3500	482205110102	1k 2% 0,25W
3501	482211710837	100k 1% 0,1W
3502	482205120479	47R 5% 0,1W
3503	482205120471	470R 5% 0,1W
3504	482205120471	470R 5% 0,1W
3505	482205120471	470R 5% 0,1W
3506	482205120471	470R 5% 0,1W
3507	482205120471	470R 5% 0,1W
3508	482205120471	470R 5% 0,1W
3509	482211711503	220R 1% 0,1W
3510	482211711503	220R 1% 0,1W
3511	482211652298	680k 5% 0,5W
3512	482211652219	330R 5% 0,5W
3513	482211652219	330R 5% 0,5W
3515	482211683868	150R 5% 0,5W
3516	482211683876	270R 5% 0,5W
3517	482211683876	270R 5% 0,5W
3518	482211683876	270R 5% 0,5W
3519	482211683876	270R 5% 0,5W
3520	482211683876	270R 5% 0,5W
3521	482211711504	270R 1% 0,1W
3522	482211683868	150R 5% 0,5W
3524	482211710833	10k 1% 0,1W
3525	482211710833	10k 1% 0,1W
3527	482205120471	470R 5% 0,1W
3534	482211652219	330R 5% 0,5W

RESISTORS

3535	482211713577	330R 1% 1,25W
3536	482211713577	330R 1% 1,25W
3538	482211713577	330R 1% 1,25W
3539	482211713577	330R 1% 1,25W
3540	482211713577	330R 1% 1,25W
3541	482211713577	330R 1% 1,25W
3544	482205120474	470k 5% 0,1W
3545	482205120474	470k 5% 0,1W
3546	482205120474	470k 5% 0,1W
3548	482211711139	1k5 1% 0,1W
3549	482205120684	680k 5% 0,1W
3550	482211710834	47k 1% 0,1W
3551	482205120474	470k 5% 0,1W
3552	482211711139	1k5 1% 0,1W
3553	482205120684	680k 5% 0,1W
3554	482211710834	47k 1% 0,1W
3555	482205120474	470k 5% 0,1W
3556	482211711139	1k5 1% 0,1W
3557	482205120684	680k 5% 0,1W
3558	482211710834	47k 1% 0,1W
3559	482205120474	470k 5% 0,1W
3571	482211711149	82k 1% 0,1W
3572	482211711149	82k 1% 0,1W
3573	482211711149	82k 1% 0,1W
3574	482211711149	82k 1% 0,1W
3575	482211711149	82k 1% 0,1W
3576	482205110102	1k 2% 0,25W
3577	482205110102	1k 2% 0,25W
3579	482205110102	1k 2% 0,25W
3580	482211710833	10k 1% 0,1W
3581	482211710833	10k 1% 0,1W
3582	482211710833	10k 1% 0,1W
3583	482211710833	10k 1% 0,1W
3586	482205120105	1M 5% 0,1W
3591	482211710833	10k 1% 0,1W
3593	482205120471	470R 5% 0,1W
3595	482211710833	10k 1% 0,1W
3596	482211710833	10k 1% 0,1W
3601	482211713577	330R 1% 1,25W
3602	482211713577	330R 1% 1,25W
3603	482211713577	330R 1% 1,25W
4000	482205120008	0R Jumper 0805
4411	482205120008	0R Jumper 0805
4412	482205120008	0R Jumper 0805
4479	482205120008	0R Jumper 0805

COILS & FILTERS

5400	482215762552	Coil 2,2µH 5%
5401	482215762552	Coil 2,2µH 5%
5402	482215711231	Coil 1µH 5%
5531	482215621721	Coil 2,2µH 10%
5532	482215621721	Coil 2,2µH 10%

DIODES

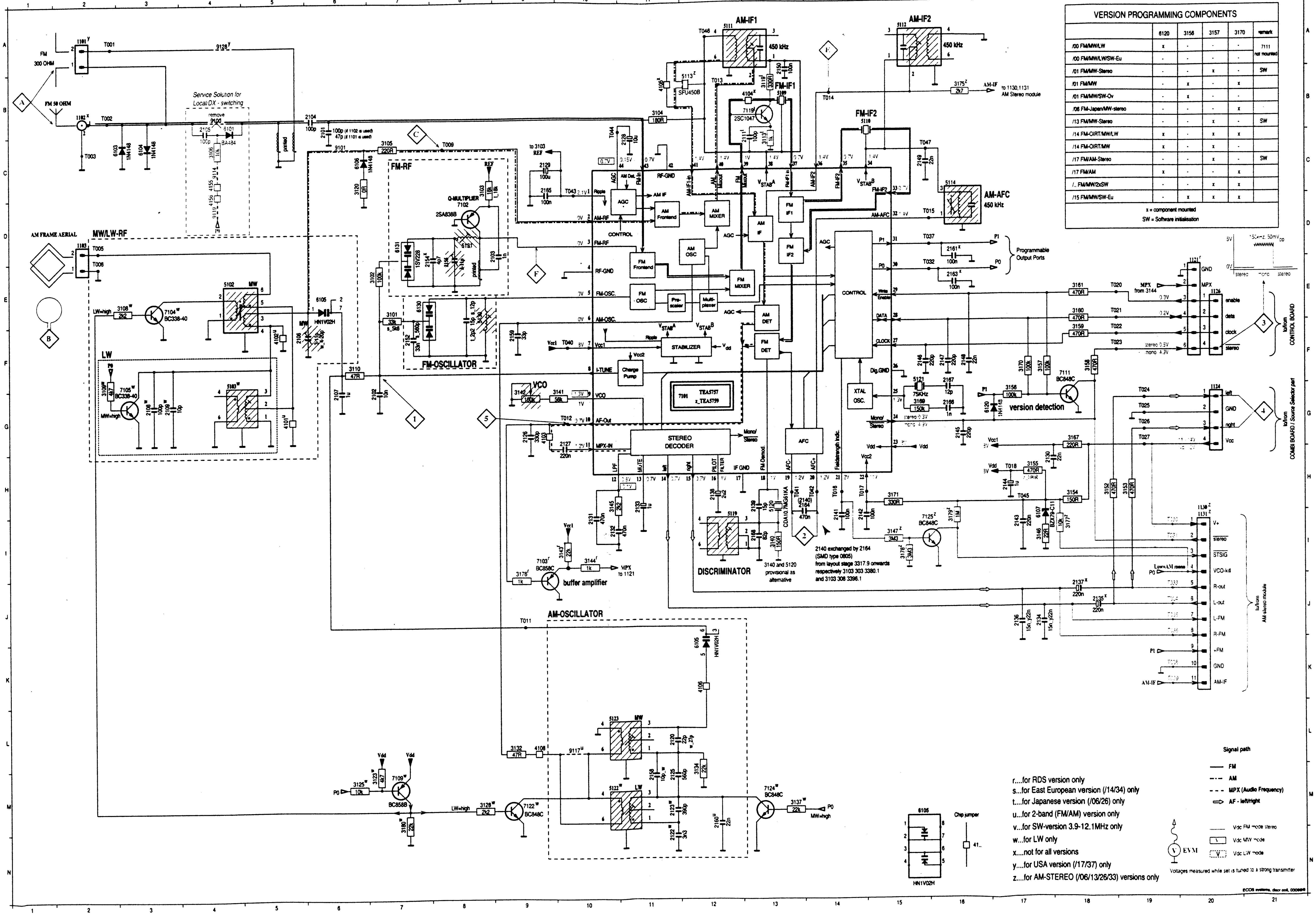
6400	482213031878	1N4003G
6401	482213082978	LTL-1CHPE
6402	482213082978	LTL-1CHPE
6403	482213082978	LTL-1CHPE
6404	482213082978	LTL-1CHPE
6405	482213082978	LTL-1CHPE
6406	482213082978	LTL-1CHPE
6407	482213082978	LTL-1CHPE
6410	482213083119	LTL-307C
6411	482213083119	LTL-307C
6461	482213030621	1N4148
6462	482213030621	1N4148
6463	482213030621	1N4148
6464	482213030621	1N4148
6465	482213030621	1N4148
6466	482213030621	1N4148
6467	482213030621	1N4148
6468	482213030621	1N4148
6469	482213030621	1N4148
6470	482213030621	1N4148
6471	482213030621	1N4148
6472	482213030621	1N4148
6473	482213030621	1N4148
6474	482213030621	1N4148

TRANSISTORS & INTEGRATED CIRCUITS

7400	310330884081	TMP87CS71F - 'MZ7S84081'
7402	482220931508	ST24C01B6
7403	482220931981	SAA6579T
7404	482213010165	GP1U28XP
7405	482220915449	74HC4094D
7406	482220915449	74HC4094D
7421	482213060511	BC847B
7422	482213060511	BC847B
7423	482213060511	BC847B
7424	482213060511	BC847B
7425	482213060511	BC847B
7427	482213060511	BC847B

Note : Only the parts mentioned in this list are normal service spare parts.

TUNER BOARD ECO5 / Systems


FM 300 OHM
FM 50 OHM
AM FRAME AERIAL
Service Solution for Local/DX - switching
remove 9100
MW/LW-RF
MW
LW
FM-RF
Q-MULTIPLIER 7102
2SA838B
FM-OSCILLATOR
VCO
AM-IF1
450 kHz
AM-IF2
FM-IF1
FM-IF2
AM-AFC
AGC
AM IF
AM Frontend
AM MIXER
FM Frontend
FM MIXER
FM OSC
Pre-scaler
Multi-plexer
AM OSC
AM DET
FM DET
STABILIZER
Charge Pump
CONTROL
XTAL OSC.
AFC
STEREO DECODER
7101 TEA5757 z_TEA5759
DISCRIMINATOR
buffer amplifier
MPX to 1121
version detection
Programmable Output Ports
to/from CONTROL BOARD
to/from COMBI BOARD / Source Selector part
to/from AM stereo module
to 1130,1131 AM Stereo module
AM-OSCILLATOR
HN1V02H
Chip jumper
150kHz, 50mVpp
stereo
mono
stereo
Low=AM mono
LW=high
MW=high
Signal path
FM
AM
MPX (Audio Frequency)
AF - left/right
EVM
Vdc FM mode stereo
Vdc MW mode
Vdc LW mode
Voltages measured while set is tuned to a strong transmitter
ECO5 systems, diecr co4, 030896

VERSION PROGRAMMING COMPONENTS	6120	3158	3157	3170	remark
/00 FM/MW/LW	x	-	-	-	7111 not mounted
/00 FM/MW/LW/SW-Eu	-	-	-	-	
/01 FM/MW-Stereo	-	-	x	-	SW
/01 FM/MW	-	x	-	x	
/01 FM/MW/SW-Ov	-	x	-	-	
/06 FM-Japan/MW-stereo	-	-	-	x	
/13 FM/MW-Stereo	-	-	x	-	SW
/14 FM-OIRT/MW/LW	x	-	x	x	
/14 FM-OIRT/MW	x	-	x	-	
/17 FM/AM-Stereo	-	-	x	-	SW
/17 FM/AM	x	-	-	x	
/.. FM/MW/2xSW	-	-	x	x	
/15 FM/MW/SW-Eu	-	x	x	x	

x = component mounted

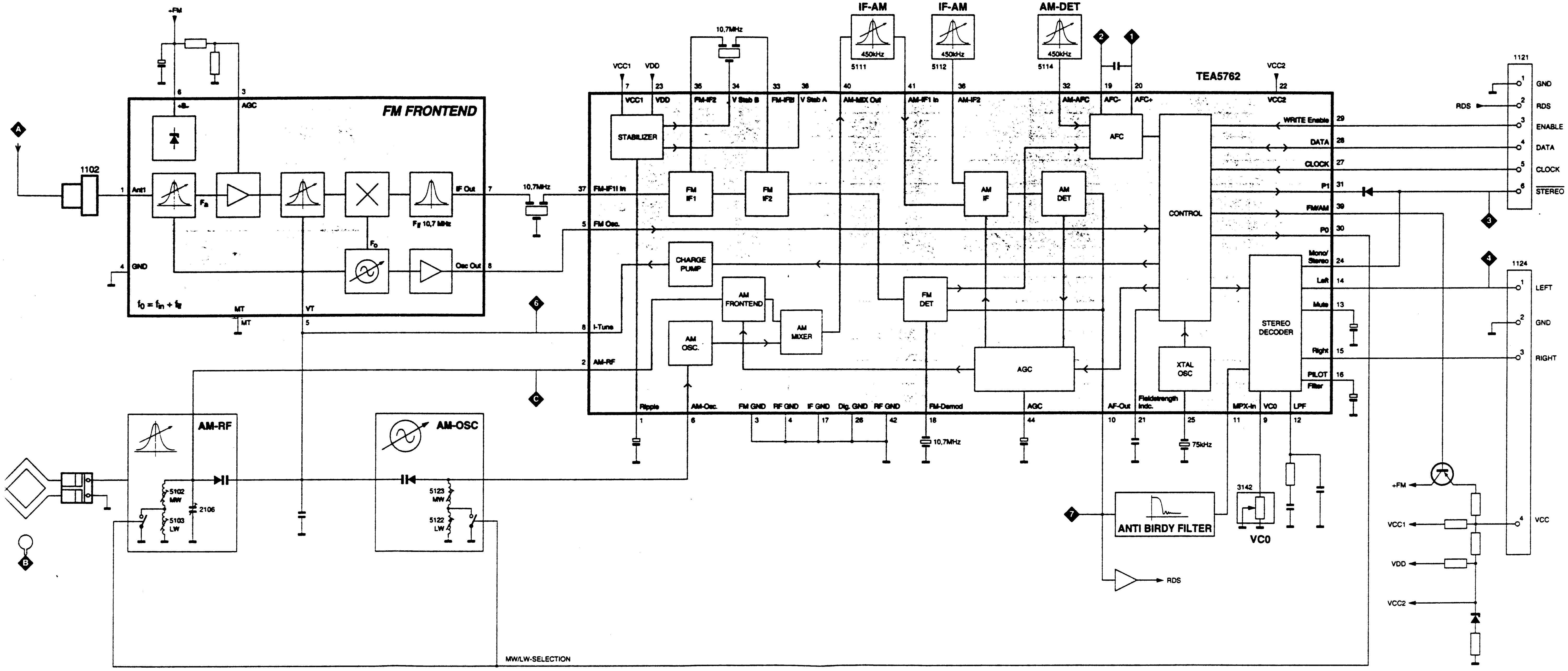
SW = Software initialisation

3140 and 5120 provisional as alternative

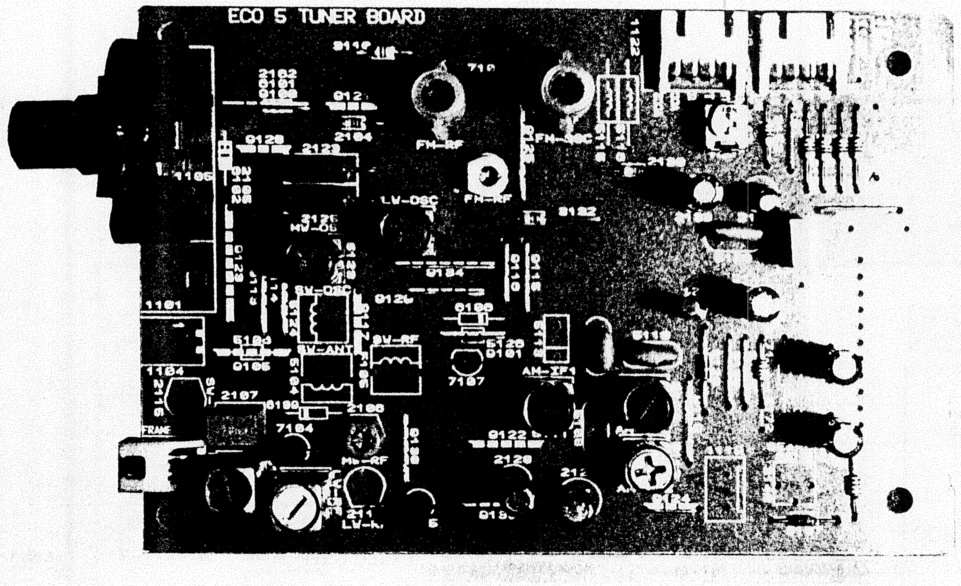
2140 exchanged by 2164
(SMD type 0805)
from layout stage 3317.9 onwards
respectively 3103 303 3380.1
and 3103 308 3396.1

r....for RDS version only
s...for East European version (/14/34) only
t....for Japanese version (/06/26) only
u...for 2-band (FM/AM) version only
v...for SW-version 3.9-12.1MHz only
w...for LW only
x....not for all versions
y....for USA version (/17/37) only
z....for AM-STEREO (/06/13/26/33) versions only

BLOCKDIAGRAM


A
1102
+FM
6
+B-
3
AGC
FM FRONTEND
1 Ant1
Fa
IF Out 7
FIf 10,7 MHz
Fo
Osc Out 8
4 GND
f0 = fin + fIf
MT
MT
VT
5
10,7MHz
10,7MHz
IF-AM
450kHz
5111
IF-AM
450kHz
5112
AM-DET
450kHz
5114
2
1
TEA5762
VCC1
VDD
VCC2
7
23
35
34
33
38
40
41
36
32
19
20
22
VCC1
VDD
FM-IF2
V Stab B
FM-IFB
V Stab A
AM-MIX Out
AM-IF1 In
AM-IF2
AM-AFC
AFC-
AFC+
VCC2
STABILIZER
FM IF1
FM IF2
AM IF
AM DET
AFC
CONTROL
37 FM-IF1I In
5 FM Osc.
CHARGE PUMP
AM FRONTEND
AM MIXER
AM OSC.
FM DET
AGC
XTAL OSC
STEREO DECODER
8 I-Tune
2 AM-RF
6
C
WRITE Enable 29
DATA 28
CLOCK 27
P1 31
FM/AM 39
P0 30
Mono/Stereo 24
Left 14
Mute 13
Right 15
PILOT Filter 16
Ripple
AM-Osc.
FM GND
RF GND
IF GND
Dig. GND
RF GND
FM-Demod
AGC
AF-Out
Fieldstrength Indc.
MPX-In
VC0
LPF
1
6
3
4
17
26
42
18
44
10
21
25
11
9
12
10,7MHz
75kHz
1121
1 GND
RDS
2 RDS
3 ENABLE
4 DATA
5 CLOCK
6 STEREO
3
4
1124
1 LEFT
2 GND
3 RIGHT
4 VCC
AM-RF
5102 MW
5103 LW
2106
B
AM-OSC
5123 MW
5122 LW
7
ANTI BIRDY FILTER
3142
VC0
RDS
+FM
VCC1
VDD
VCC2
MW/LW-SELECTION

BLOCKDIAGRAM


ECO 5 TUNER BOARD
FM-RF
FM-OSC
LW-OSC
MW-OSC
SW-OSC
SW-ANT
SW-RF
AM-IF1
MW-RF
LW-RF
1101
1104
1106
1122
7104
7107
FRAME

TUNER BOARD ECO5

TABLE OF CONTENTS

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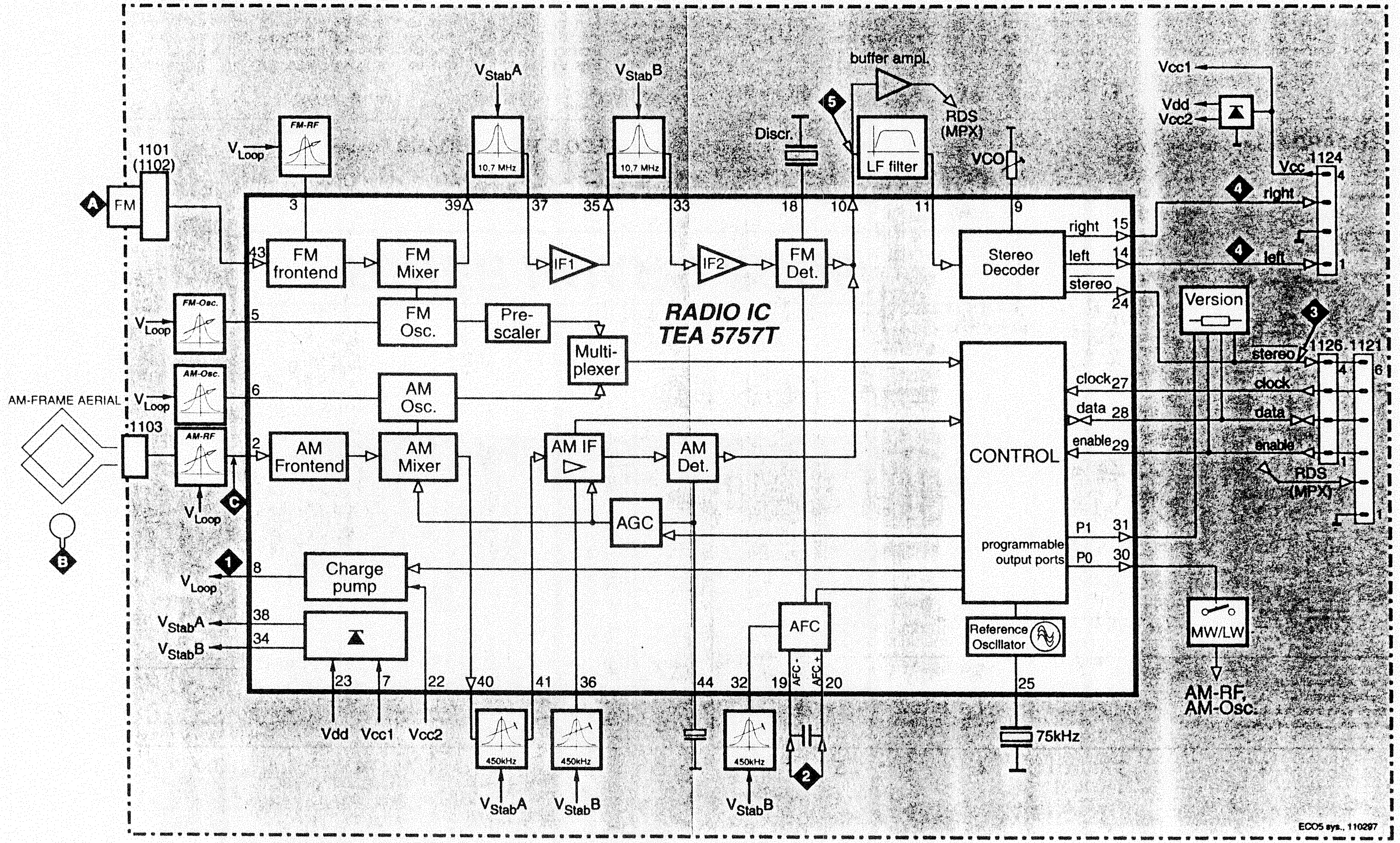
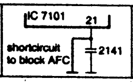
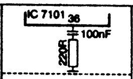
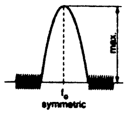
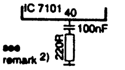
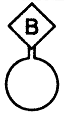
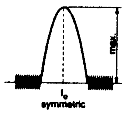
Adjustmant table 7B-2
Component layout 7B-2
Circuit diagram 7B-3
Partslist 7B-4

TUNER BOARD

ECO 5 systems


RADIO IC
TEA 5757T
A
FM
1101
(1102)
V_Loop
FM-RF
V_Stab A
10,7 MHz
V_Stab B
10,7 MHz
Discr.
buffer ampl.
5
LF filter
RDS
(MPX)
VCO
Vcc1
Vdd
Vcc2
Vcc
1124
4
right
left
1
3
39
37
35
33
18
10
11
9
43
FM frontend
FM Mixer
IF1
IF2
FM Det.
Stereo Decoder
right 15
left 14
stereo 24
FM-Osc.
V_Loop
5
FM Osc.
Pre-scaler
Multi-plexer
Version
3
1126
1121
stereo
clock
data
enable
RDS
(MPX)
4
6
1
1
AM-Osc.
V_Loop
6
AM Osc.
AM-FRAME AERIAL
1103
AM-RF
2
AM Frontend
AM Mixer
AM IF
AM Det.
AGC
CONTROL
clock 27
data 28
enable 29
P1 31
P0 30
programmable output ports
C
V_Loop
B
1
8
V_Loop
Charge pump
38
V_Stab A
34
V_Stab B
23
7
22
40
41
36
44
32
19
AFC-
AFC+
20
25
AFC
Reference Oscillator
Vdd
Vcc1
Vcc2
450kHz
450kHz
450kHz
V_Stab A
V_Stab B
V_Stab B
2
75kHz
MW/LW
AM-RF,
AM-Osc.
ECO5 sys., 110297

TUNER ADJUSTMENT TABLE (ECO5 FM/MW- and FM/MW/LW - versions with AM-frame aerial)

Waverange	Input frequency	Input	Tuned to	Adjust	Output	Scope/Voltmeter	
VARICAP ALIGNMENT							
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)			108MHz	5130	◇ 1	8V ±0.2V	
			87.5MHz (65.81MHz)	check		4.3V ±0.5V (1.2V ±0.5V)	
MW FM/AM-version, 10kHz grid 530 - 1700kHz			1700kHz	5123		8V ±0.2V	
			530kHz	check		1.1V ±0.4V	
FM/MW-version, 9kHz grid 531 - 1602kHz			1602kHz	5123		6.9V ±0.2V	
			531kHz	check		1.1V ±0.4V	
LW 153 - 279kHz			279kHz	5122		8V ±0.2V	
			153kHz	check		1.1V ±0.4V	
MW FM/MW/LW- version, 9kHz grid 531 - 1602kHz			1602kHz	5123		8V ±0.2V	
			531kHz	check		1.1V ±0.4V	
FM IF							
FM	10.7MHz, 50mV continuous wave	◇ F		5119	◇ 2	0 ± 3 mV DC	
FM RF							
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)	108MHz	◇ A	108MHz	2155	◇ 4	MAX	↕
	87.5MHz (65.81MHz)	mod=1kHz Δf=±22.5kHz	87.5MHz (65.81MHz)	5131			
VCO							
FM	98MHz, 1mV continuous wave	◇ A	98MHz	3142	◇ 3	152kHz ±1kHz 1)	
AM IF							
MW	450kHz connect pin 6 of IC 7101 (AM Osc.) with short wire to ground (pin 4)	◇ C Δf=±15kHz V_{RF} = 3mV		5111	◇ 4		
				5112			
AM AFC **MW**		◇ C continuous wave V_{RF} = 10mV		5114	◇ 2	0 ± 2 mV DC	
AM RF 3)							
MW 4) FM/MW/LW- and FM/MW-version (9kHz grid) 531 - 1602kHz	1494kHz	 Δf = ±30kHz V_{RF} as low as possible	1494kHz	2106	◇ 4		↕
	558kHz		558kHz	5102			
LW	198kHz		198kHz	5103			
MW FM/AM-version, 10kHz grid 530 - 1700kHz	1500kHz		1500kHz	2106			↕
	560kHz		560kHz	5102			

ECO5 discr. coll. 080797

Use service test program. By selecting the TUNER TEST test frequencies will be stored as preset frequencies automatically.

1) If sensitivity of frequency counter is too low adjust to max. channel separation (input signal: stereo left 90% + 9%, adjust output on right channel to minimum)

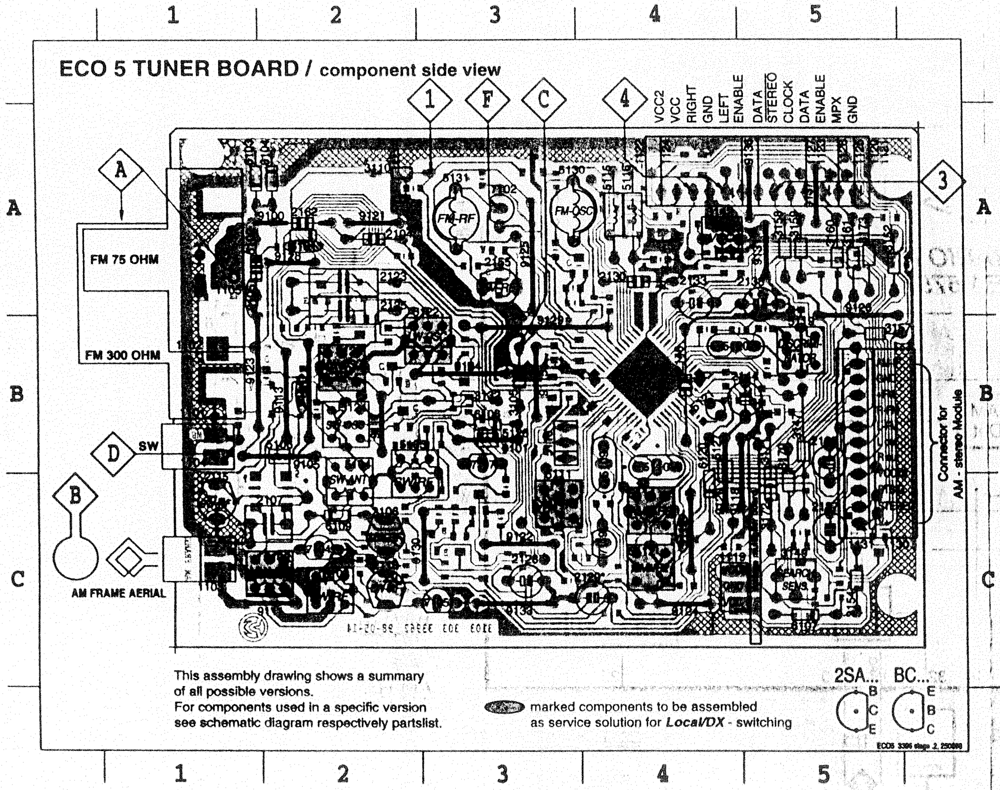
2) RC network serves for damping the IF-filter while adjusting the other one.

3) For AM RF adjustments the original frame antenna has to be used !

4) MW has to be aligned before LW.

↕ Repeat

1101	A1	2106	C2	2137	C5	3149	C5	3173	A5	5114	C4	5130	A3	7104	C2	9117	B2	9129	B3
1102	A1	2107	C2	2138	A5	3152	A5	5102	C2	5115	A4	5131	A3	7105	C3	9118	B4	9130	C3
1103	C1	2110	C2	2144	B5	3154	C5	5103	C2	5116	A4	6101	A2	7107	B3	9119	C4	9131	A5
1104	B1	2115	C1	2148	B4	3157	B5	5104	C2	5119	B5	6102	A1	7119	C4	9120	B4	9133	C3
1105	A1	2123	A2	2155	A3	3158	A5	5105	B2	5120	B4	6103	A1	9100	A2	9121	A2	9134	B3
1119	C5	2125	A2	2162	A2	3159	A5	5106	B2	5121	B4	6104	A2	9101	B3	9122	C3	9136	A5
1120	A5	2128	C3	3105	B3	3160	A5	5109	B4	5122	B3	6106	B3	9105	B2	9123	B1	9137	A5
1130	B5	2129	C4	3110	A2	3161	A5	5110	B4	5123	B2	6107	C5	9111	C2	9124	C4		
1131	B5	2130	A4	3132	B3	3170	C5	5111	C3	5124	B2	6109	C2	9113	B2	9125	A3		
2104	A2	2133	A4	3142	A4	3171	C5	5112	C4	5126	B3	6120	C4	9114	B2	9126	B5		
2105	A1	2135	B5	3147	B5	3172	C5	5113	B3	5127	B4	7102	A3	9115	B3	9128	A2		

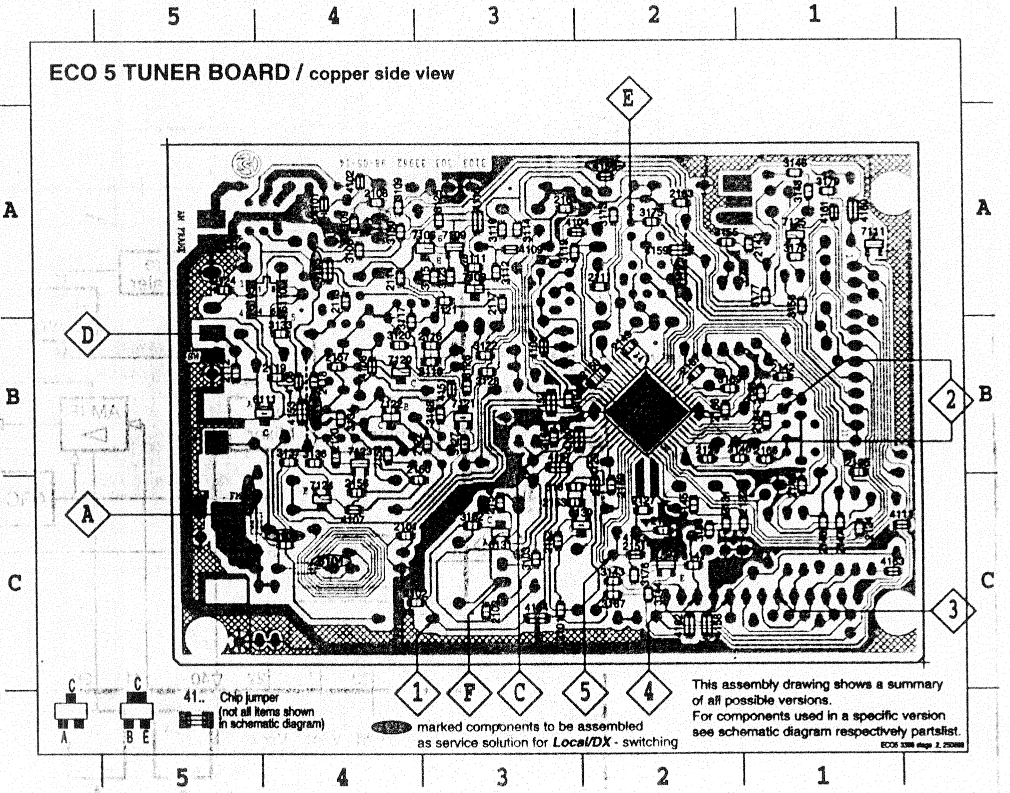


ECO 5 TUNER BOARD / component side view

This assembly drawing shows a summary of all possible versions.
For components used in a specific version see schematic diagram respectively partslist.

marked components to be assembled as service solution for ***Local/DX*** - switching

2101	C4	2118	B4	2139	B2	2153	C3	2166	B2	3112	A3	3123	A3	3143	C2	3175	A2	4105	B3	4153	B4	6105	A4	7120	B4
2102	C4	2119	B4	2141	B1	2154	C3	2167	B2	3113	A2	3125	A3	3144	C2	3176	C2	4106	B4	4154	C3	6110	A4	7121	B3
2103	C3	2120	B4	2142	B1	2156	C4	2168	B1	3114	A3	3126	B3	3145	C2	3177	A1	4107	C4	4155	A4	6111	B4	7122	B4
2108	A4	2122	B3	2143	A1	2157	B4	3101	C3	3115	A3	3127	B3	3146	A1	3178	A1	4108	B4	4156	A2	6130	C2	7123	B4
2109	A4	2124	A5	2145	C1	2158	B4	3102	C3	3116	A3	3128	B3	3148	A1	3179	A1	4109	A3	4157	B3	6131	C3	7124	C4
2111	A2	2126	C2	2146	C1	2159	C2	3103	C3	3117	B4	3133	B4	3153	C2	3180	A4	4110	A3	4158	C2	7101	B2	7125	A1
2112	B5	2127	C2	2147	C1	2160	C4	3104	B3	3118	B3	3134	B4	3155	A2	3181	C3	4111	C1	4159	A2	7103	C2		
2113	A4	2131	C2	2149	B2	2161	A3	3106	C4	3119	A3	3136	B4	3156	A1	4101	A4	4120	C2	4160	A1	7106	A3		
2114	A4	2132	C1	2150	B2	2163	A2	3108	A4	3120	B4	3137	B4	3167	C2	4102	A4	4150	B2	4161	A1	7108	A3		
2116	B3	2134	C1	2151	C2	2164	B1	3109	A4	3121	A3	3140	B2	3168	B3	4103	C2	4151	B3	4162	C1	7109	A3		
2117	A3	2136	B1	2152	C3	2165	B3	3111	A3	3122	B3	3141	C2	3169	B2	4104	A2	4152	B3	4163	C1	7111	A1		



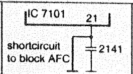
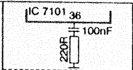
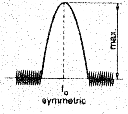
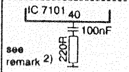
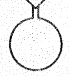
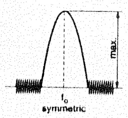
ECO 5 TUNER BOARD / copper side view

41.. Chip jumper (not all items shown in schematic diagram)

marked components to be assembled as service solution for ***Local/DX*** - switching

This assembly drawing shows a summary of all possible versions.
For components used in a specific version see schematic diagram respectively partslist.

TUNER ADJUSTMENT TABLE (ECO5 FM/MW- and FM/MW/LW - versions with AM-frame aerial)

Waverange	Input frequency	Input	Tuned to	Adjust	Output	Scope/Voltmeter
VARICAP ALIGNMENT						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)			108MHz	5130	◇1	8V ±0.2V
			87.5MHz (65.81MHz)	check		4.3V ±0.5V (1.2V ±0.5V)
MW FM/AM-version, 10kHz grid 530 - 1700kHz			1700kHz	5123		8V ±0.2V
			530kHz	check		1.1V ±0.4V
FM/MW-version, 9kHz grid 531 - 1602kHz			1602kHz	5123		6.9V ±0.2V
			531kHz	check		1.1V ±0.4V
LW 153 - 279kHz			279kHz	5122		8V ±0.2V
			153kHz	check		1.1V ±0.4V
MW FM/MW/LW- version, 9kHz grid 531 - 1602kHz			1602kHz	5123		8V ±0.2V
			531kHz	check		1.1V ±0.4V
FM IF						
FM	10.7MHz, 50mV continuous wave	◇F		5119	◇2	0 ± 3 mV DC
FM RF						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)	108MHz	◇A mod=1kHz Δf=±22.5kHz	108MHz	2155	◇4	MAX ↕
	87.5MHz (65.81MHz)		87.5MHz (65.81MHz)	5131		
VCO						
FM	98MHz, 1mV continuous wave	◇A	98MHz	3142	◇3	152kHz ±1kHz [1]
AM IF						
MW	450kHz connect pin 6 of IC 7101 (AM Osc.) with short wire to ground (pin 4)	◇C Δf=±15kHz V_{RF} = 3mV		5111	◇4	
				5112		
AM AFC **MW**		◇C continuous wave V_{RF} = 10mV		5114	◇2	0 ± 2 mV DC
AM RF [3]						
MW [4] FM/MW/LW- and FM/MW-version (9kHz grid) 531 - 1602kHz	1494kHz	◇B  Δf = ±30kHz V_{RF} as low as possible	1494kHz	2106	◇4	 ↕
	558kHz		558kHz	5102		
LW	198kHz		198kHz	5103		
MW FM/AM-version, 10kHz grid 530 - 1700kHz	1500kHz		1500kHz	2106		↕
	560kHz		560kHz	5102		

ECO5 discr. coil, 090797

Use service test program. By selecting the TUNER TEST test frequencies will be stored as preset frequencies automatically.

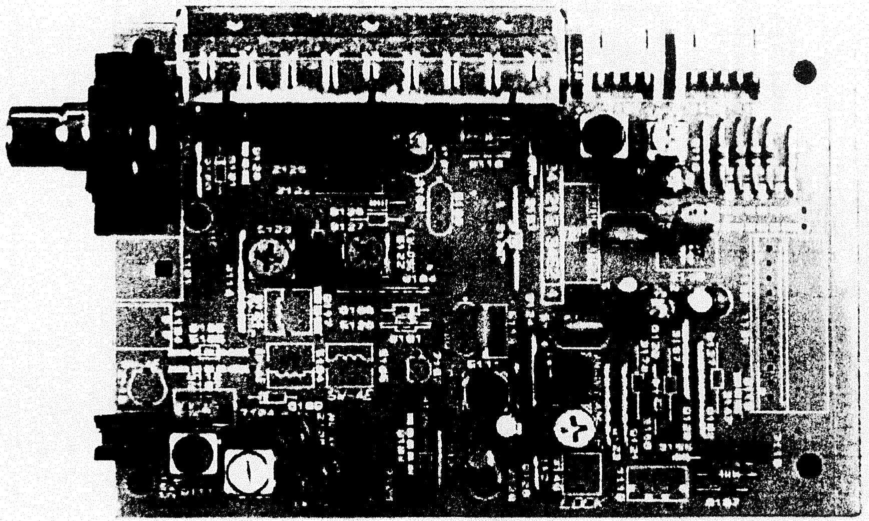
[1] If sensitivity of frequency counter is too low adjust to max. channel separation (input signal: stereo left 90% + 9%, adjust output on right channel to minimum)

[2] RC network serves for damping the IF-filter while adjusting the other one.

[3] For AM RF adjustments the original frame antenna has to be used !

[4] MW has to be aligned before LW.

↕ Repeat



TUNER 95 BOARD

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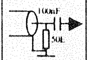
TUNER 95 bis Adjustment Table (FM, MW, LW with Frame antenna)

Waverange	Input frequency	Input	Set tuned to	Adjust	Output	Scope / Voltmeter
VARICAP ALIGNMENT						
FM (50) 87.5 - 108 MHz			108 MHz	check	◇6	7 ... 9V
			87.5 MHz	check		1.3 ... 2V
MW (9) 531 - 1602 kHz			1602 kHz	5123		8.3V ± 0.2V
			531 kHz	check		1V ± 0.4V
LW (3) 153 - 279 kHz			279 kHz	5122		8.3V ± 0.2V
			153 kHz	check		1V ± 0.4V
FM – DETECTION						
FM	98 MHz 1mV continuous wave ***short pin 21 (IC7101) to ground***	◇A	98 MHz	5107	◇1 ◇2	0mV ± 3mV
FM – VCO						
FM	98 MHz, 1 mV continuous wave	◇A	98 MHz	3142	◇3	152kHz ± 1 kHz
DISTORTION						
FM	98 MHz 1 mV 90 % L + 9 % pilot mod = 1kHz	◇A	98MHz	mixcoil inside Tuner 1110	◇4	Distortion minimum
AM – IF						
MW	450kHz Δf = 10kHz Low as possible Swept signal	 ◇C	MW	5111	◇7	symmetrical and max. height ↕
				5112		
	450kHz continuous wave			5114	◇1 ◇2	0mV ± 2mV
AM - RF						
MW	558kHz Mod = 1kHz 30 % AM 1494 kHz	◇B	558kHz	5102	◇7	MAX ↕
			1494kHz	2106		
LW	198kHz mod = 1kHz 30 % AM	*	198kHz	5103		MAX

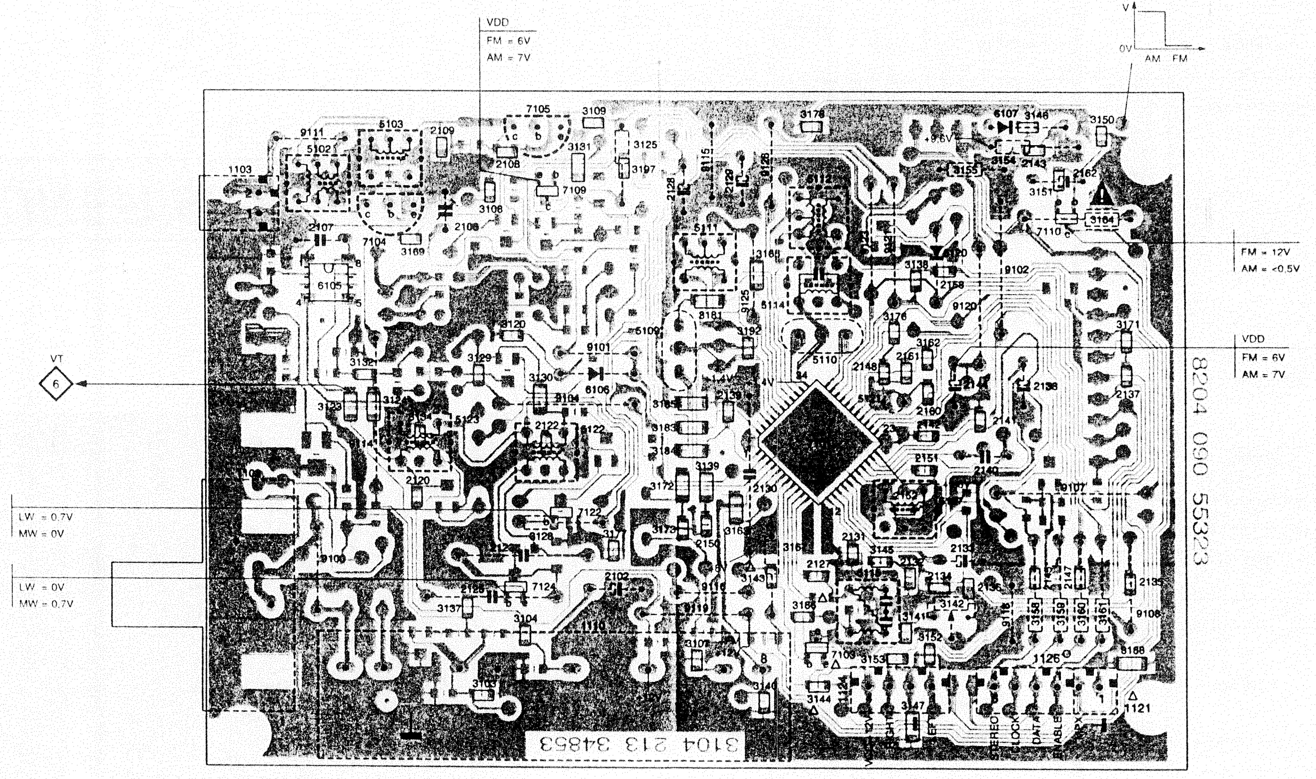
adjtable for 3104 217 04121/04341

* Signal send via a frame antenna
(..) = tuning grid in kHz

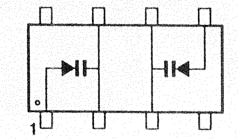
↕ repeat

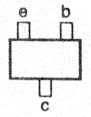
1102	F4
1103	C4
1110	G7
1121	H11
1124	H9
1126	G10
2102	G7
2106	C5
2107	C4
2108	C6
2109	C5
2120	F5
2122	E6
2123	F6
2125	G6
2127	F9
2128	C7
2129	C8
2130	F8
2131	F9
2132	F9
2133	F10
2134	G10
2135	G11
2136	G10
2137	E11
2138	E10
2139	E8
2140	F10
2141	E10
2142	E9
2143	C10
2144	E10
2145	G11
2147	G11
2148	E9
2150	F8
2151	F9
2152	F9
2158	D10
2160	E9
2161	E9
2162	C11
3103	H6
3104	G6
3107	G7
3108	C6
3109	B7
3120	D6
3123	E4
3124	E5
3125	C7
3128	F6
3129	E6
3130	E6
3131	C6
3132	E5
3134	E5
3137	G5
3138	D9
3139	F8
3140	H8
3141	G9
3142	G10
3143	G8
3144	H9
3145	F9
3146	B10
3147	H9
3150	C11
3151	C10
3152	G9
3153	G9
3154	C10
3155	C10
3158	G11
3159	G11
3160	G11
3161	G11
3162	D9
3163	F8
3164	C11
3165	D8
3167	F8
3169	D5
3171	D11
3172	F7
3173	F7
3176	D9
3177	F7
3178	B8
3181	D8
3183	E7
3184	E7
3185	E7
3186	G8
3188	G11
3192	D8
3197	C7
5102	C4
5103	C5
5107	F10
5109	D7
5110	E9
5111	C8
5112	C9
5114	D8
5115	G9
5121	E9
5122	E7
5123	E5
6105	D4
6106	E7
6107	B10
6120	D10
7101	E9
7103	G9
7104	D5
7105	B6
7109	C6
7110	D11
7122	F7
7124	G6
9100	F4
9101	E7
9102	D10
9104	E6
9107	F11
9108	G11
9111	C4
9114	E5
9115	C8
9116	G8
9118	G10
9119	G7
9120	D10
9121	D9
9123	D9
9125	D8
9126	C8

TUNER 95 bis Combi: Copper side view


1 2 3 4 5 6 7 8 9 10 11 12 13
A B C D E F G H I J
VDD
FM = 6V
AM = 7V
V
0V
AM FM
FM = 12V
AM = <0.5V
VDD
FM = 6V
AM = 7V
VT
6
LW = 0.7V
MW = 0V
LW = 0V
MW = 0.7V
8204 090 55323
3104 213 34853
7105
3109
3178
6107
3146
3150
9111
5103
2109
5102
3131
3125
3197
3154
2143
2162
3151
3164
1103
2108
7109
3155
2107
3108
2106
7110
7104
3169
5111
6105
3166
3138
9102
2158
5114
9120
3176
3171
3120
6109
9101
3192
3162
2161
5110
2148
3132
3129
3130
6106
2136
2137
3123
3124
3104
2122
3183
2160
2141
3184
2151
2140
2120
3139
3172
3130
9107
3173
7122
3128
3171
3163
2150
2131
3145
9100
2127
2133
3143
2134
2135
2102
7124
3186
3142
3141
9108
3137
3104
3152
3158
3159
3160
3161
3188
1110
3107
7103
3153
1126
3103
3144
3147
1121
STEREO
LOCK
DATA
ENABLE

IC 6105





△ only in RDS version (04121)

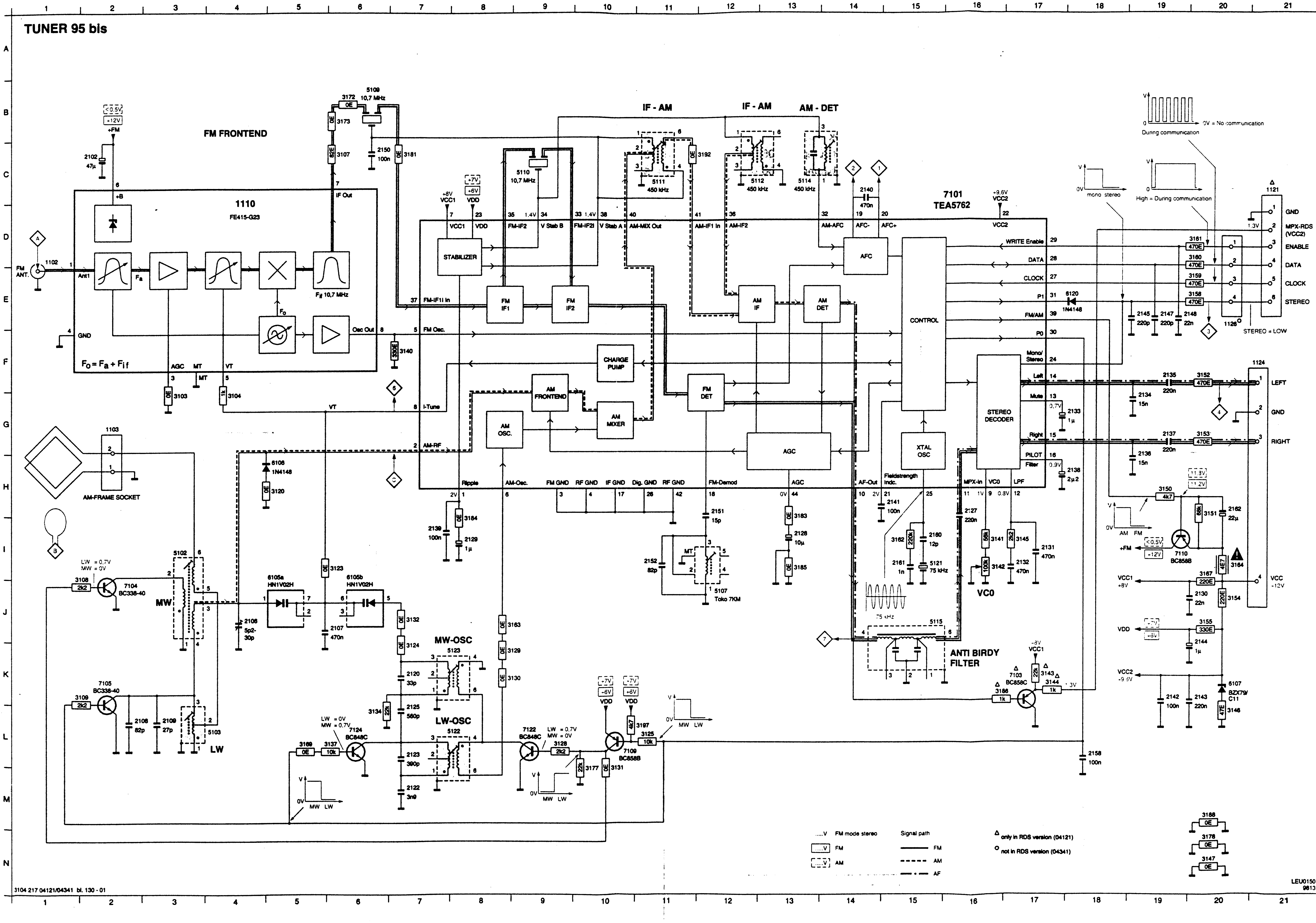
○ not in RDS version (04341)

1102	D1	1124	F21	2107	J6	2122	M7	2128	I13	2132	I17	2136	H19	2140	C14	2144	K20	2150	C6
1103	G2	1126	E20	2108	L2	2123	L7	2129	I8	2133	G18	2137	G19	2141	H15	2145	E19	2151	H12
1110	D4	2102	C2	2109	L3	2125	L7	2130	J20	2134	G19	2138	H18	2142	K19	2147	E19	2152	I11
1121	C21	2106	J4	2120	K7	2127	H16	2131	I17	2135	F19	2139	I7	2143	K20	2148	E19	2158	L18

2160	I15	3104	G4	3120	H5	3128	L9	3132	J7	3141	I16	3145	I17	3151	I20	3155	J20	3161	D19
2161	I15	3107	C6	3123	I6	3129	K8	3134	L6	3142	I16	3146	L20	3152	F20	3158	E19	3162	I15
2162	H20	3108	J1	3124	K7	3130	K8	3137	L5	3143	K17	3147	N20	3153	G20	3159	E19	3163	J8
3103	G3	3109	K1	3125	L11	3131	M10	3140	F7	3144	K17	3150	H19	3154	J20	3160	D19	3164	I20

3167	I20	3177	M10	3184	I8	3192	C12	5107	J12	5112	C12	5122	L7	6106	H5	7103	K17	7110	H19
3169	L5	3178	N20	3185	I13	3197	L11	5109	B6	5114	C13	5123	K7	6107	K20	7104	J2	7122	L9
3172	B6	3181	C7	3186	K16	5102	I3	5110	C9	5115	J15	6105a	I5	6120	E17	7105	K2	7124	L6
3173	B6	3183	I13	3188	M20	5103	L4	5111	C11	5121	I15	6105b	I6	7101	C15	7109	L10		

TUNER 95 bis



FM FRONTEND
1110
FE415-G23
FM ANT.
1102
Ant1
Fa
Fif 10,7 MHz
Fo
IF Out
Osc Out
GND
+B
AGC
MT
VT
Fo = Fa + Fif
+FM
<0.5V
+12V
2102 47µ
5109 10,7 MHz
3172 0E
3173 0E
3107 82E
2150 100n
3181 0E
3140 330E
3103 0E
3104 1k
IF - AM
IF - AM
AM - DET
5110 10,7 MHz
5111 450 kHz
5112 450 kHz
5114 450 kHz
3192 0E
2140 470n
7101
TEA5762
+8V VCC1
+7V +6V VDD
+9.6V VCC2
STABILIZER
FM IF1
FM IF2
AM IF
AM DET
AFC
CONTROL
CHARGE PUMP
AM FRONTEND
AM MIXER
AM OSC.
FM DET
AGC
XTAL OSC
STEREO DECODER
FM-IF2
V Stab B
FM-IF2I
V Stab A
AM-MIX Out
AM-IF1 In
AM-IF2
AM-AFC
AFC-
AFC+
37 FM-IF1 In
5 FM Osc.
8 I-Tune
2 AM-RF
Ripple
AM-Osc.
FM GND
RF GND
IF GND
Dig. GND
RF GND
FM-Demod
AGC
AF-Out
Fieldstrength Indc.
MPX-In
VCO
LPF
WRITE Enable 29
DATA 28
CLOCK 27
P1 31
FM/AM 39
P0 30
Mono/Stereo 24
Left 14
Mute 13
Right 15
PILOT 16
Filter
6120 1N4148
3161 470E
3160 470E
3159 470E
3158 470E
2145 220p
2147 220p
2148 22n
1126
1121
GND
MPX-RDS (VCC2)
ENABLE
DATA
CLOCK
STEREO
STEREO = LOW
0V = No communication
During communication
mono stereo
High = During communication
1124
2135 220n
3152 470E
LEFT
2134 15n
2133 1µ
GND
2137 220n
3153 470E
RIGHT
2136 15n
2138 2µ2
3150 4k7
11.8V
11.2V
3151 68k
2162 22µ
AM FM
+FM
<0.5V
+12V
7110 BC858B
3164 4E7
VCC1 +8V
3167 220E
2130 22n
3154 220E
VCC -12V
VDD
+7V
+6V
3155 330E
2144 1µ
VCC2 -9.6V
6107 BZX79/C11
2142 100n
2143 220n
3146 47E
2139 100n
3184 0E
2129 1µ
2151 15p
2152 82p
5107 Toko 7KM
3183 0E
2128 10µ
3185 0E
2141 100n
2127 220n
3162 220k
2160 12p
2161 1n
5121 75 kHz
3141 56k
3145 2k2
3142 100k
2132 470n
2131 470n
VC0
75 kHz
5115
ANTI BIRDY FILTER
+8V VCC1
7103 BC858C
3143 22k
3144 1k
3186 1k
3V
AM-FRAME SOCKET
1103
LW = 0.7V
MW = 0V
3108 2k2
7104 BC338-40
5102
MW
6106 1N4148
3120 0E
6105a HN1V02H
6105b HN1V02H
2106 5p2-30p
3123 0E
2107 470n
3132 0E
3124 0E
MW-OSC
5123
2120 33p
3134 22k
2125 560p
LW-OSC
5122
2123 390p
2122 3n9
3163 0E
3129 0E
3130 0E
7105 BC338-40
3109 2k2
2108 82p
2109 27p
5103
LW
LW = 0V
MW = 0.7V
7124 BC848C
3169 0E
3137 10k
7122 BC848C
LW = 0.7V
MW = 0V
3128 2k2
3177 22k
3131 0E
+7V -6V VDD
+7V +6V VDD
3197 4k7
3125 10k
7109 BC858B
MW LW
2158 100n
3188 0E
3178 0E
3147 0E
.....V FM mode stereo
V FM
V AM
Signal path
FM
AM
AF
only in RDS version (04121)
not in RDS version (04341)

3104 217 04121/04341 bl. 130 - 01

LEU0150
9813

ELECTRICAL PARTS LIST - ECO5 TUNER BOARD

MISCELLANEOUS

1101	4822 267 31505	Antenna Socket 300R	
1102	4822 267 10283	Antenna Socket Coax IEC 75R	

CAPACITORS

2101	5322 122 32531	100pF 5% 50V	
2101	4822 126 13692	47pF 1% 63V	for USA
2102	4822 122 33177	10nF 20% 50V	
2103	5322 122 34123	1nF 10% 50V	
2104	4822 122 33195	100pF 10% 50V	
2106	4822 125 50355	Trimmer 4-20pF	for LW version
2106	4822 125 60101	Trimmer 3-11pF 100V	
2107	4822 121 51319	1µF 10% 63V	
2108	5322 122 32531	100pF 5% 50V	for LW version
2109	5322 122 32448	10pF 5% 50V	for LW version
2120	4822 126 13691	27pF 1% 63V	for LW version
2120	5322 122 32658	22pF 5% 50V	
2122	4822 122 33891	3,3nF 10% 63V	for LW version
2125	4822 121 51381	560pF 5% 400V	
2126	5322 122 31863	330pF 5% 50V	
2127	4822 126 13473	220nF +80/-20% 50V	
2128	4822 124 41579	10µF 20% 50V	
2129	4822 124 41584	100µF 20% 10V	
2130	4822 126 11585	22nF+80/- 20% 25V	
2131	4822 122 33325	470nF 16V	
2132	4822 122 33325	470nF 16V	
2131	4822 126 13482	470nF +80/- 20% 16V	
2132	4822 126 13482	470nF +80/- 20% 16V	
2133	4822 124 40242	1µF 20% 63V	
2134	4822 126 13188	15nF 5% 63V	
2134	5322 122 32654	22nF 10% 63V	for USA
2135	4822 124 40746	0,22µF 20% 63V	
2136	4822 126 13188	15nF 5% 63V	
2136	5322 122 32654	22nF 10% 63V	for USA
2137	4822 124 40746	0.22µF 20% 63V	
2138	4822 124 41576	2,2µF 20% 50V	
2139	4822 126 14236	50V 15pF 5%	
2140	4822 121 51252	470nF 5% 63V	
2141	4822 126 10002	100nF 20% 25V	
2142	4822 126 10002	100nF 20% 25V	
2143	4822 126 13473	220nF +80/-20% 50V	
2144	4822 124 40242	1µF 20% 63V	
2145	4822 122 33575	220pF 5% 50V	
2146	4822 122 33575	220pF 5% 50V	
2147	4822 122 33575	220pF 5% 50V	
2148	4822 126 11585	22nF+80/- 20% 25V	
2149	5322 122 32654	22nF 10% 63V	
2150	4822 122 31947	100nF 20% 63V	
2152	5322 116 80853	560pF 5% 63V	for East. Europe
2152	4822 126 12105	33nF 5% 63V	
2153	4822 122 32139	12pF 2% 63V	for East. Europe
2153	4822 122 32504	15pF 2% 63V	
2155	4822 125 60101	Trimmer 3-11pF 100V	
2158	5322 122 32448	10pF 5% 50V	for LW version
2159	5322 122 32659	33pF 5% 50V	
2160	5322 122 32654	22nF 10% 63V	
2161	4822 126 10002	100nF 20% 25V	
2163	4822 126 10002	100nF 20% 25V	
2164	4822 126 13482	470nF +80/- 20% 16V	
2165	4822 126 10002	100nF 20% 25V	
2166	5322 122 34123	1nF 10% 50V	
2167	4822 122 32139	12pF 2% 63V	
2168	4822 126 13695	82pF 1% 63V	

RESISTORS

3101	4822 051 20562	5k6 5% 0,1W	for East. Europe
3101	4822 051 20333	33k 5% 0,1W	
3102	4822 051 20104	100k 5% 0,1W	
3103	4822 117 10965	18k 1% 0,1W	
3104	4822 117 11448	180R 1% 0,1W	
3105	4822 116 83872	220R 5% 0,5W	
3108	4822 117 11449	2k2 1% 0,1W	for LW version
3109	4822 051 20472	4k7 5% 0,1W	for LW version
3110	4822 116 52195	47R 5% 0,5W	
3120	4822 051 20008	0R Jumper 0805	
3123	4822 051 20472	4k7 5% 0,1W	for LW version
3125	4822 117 10833	10k 1% 0,1W	for LW version
3128	4822 117 11449	2k2 1% 0,1W	for LW version
3132	4822 116 52195	47R 5% 0,5W	
3134	4822 051 20223	22k 5% 0,1W	
3137	4822 051 20223	22k 5% 0,1W	for LW version
3140	4822 051 20008	0R Jumper 0805 5120=CDA10.7MG40K	
3140	4822 117 10353	150R 1% 0,1W 5120=CDA10.7MG61KA	
3141	4822 051 20563	56k 5% 0,1W	
3142	4822 100 11163	Trimmer 100k 30% 0,1W	
3143	4822 051 20223	22k 5% 0,1W	for RDS version
3144	4822 051 10102	1k 2% 0,25W	for RDS version
3145	4822 117 11449	2k2 1% 0,1W	
3146	4822 051 20229	22R 5% 0,1W	
3152	4822 116 83883	470R 5% 0,5W	
3153	4822 051 20471	470R 5% 0,1W	
3154	4822 116 83868	150R 5% 0,5W	
3155	4822 051 20471	470R 5% 0,1W	
3156	4822 051 20104	100k 5% 0,1W	for /21/30/33 only
3157	4822 116 52234	100k 5% 0,5W	for East. Europe
3158	4822 116 83883	470R 5% 0,5W	
3159	4822 116 83883	470R 5% 0,5W	
3160	4822 116 83883	470R 5% 0,5W	
3161	4822 116 83883	470R 5% 0,5W	
3167	4822 117 11503	220R 1% 0.1W	
3169	4822 051 20154	150k 5% 0,1W	
3170	4822 116 52234	100k 5% 0,5W	
3171	4822 116 52219	330R 5% 0,5W	
3176	4822 051 10102	1k 2% 0,25W	for RDS version
3180	4822 051 20223	22k 5% 0,1W	for LW version
4101	4822 051 20008	0R Jumper 0805	for 2-Band only
4102	4822 051 20008	0R Jumper 0805	for 2-Band only
4103	4822 051 20008	0R Jumper 0805	
4104	4822 051 20008	0R Jumper 0805	
4105	4822 051 20008	0R Jumper 0805	
4106	4822 051 20008	0R Jumper 0805	
4108	4822 051 20008	0R Jumper 0805	
4111	4822 051 20008	0R Jumper 0805	
4120	4822 051 20008	0R Jumper 0805	
4150	4822 051 10008	0R Jumper 1206	
4151	4822 051 20008	0R Jumper 0805	
4152	4822 051 10008	0R Jumper 1206	
4153	4822 051 10008	0R Jumper 1206	
4154	4822 051 10008	0R Jumper 1206	
4155	4822 051 10008	0R Jumper 1206	
4156	4822 051 20008	0R Jumper 0805	
4157	4822 051 10008	0R Jumper 1206	
4158	4822 051 10008	0R Jumper 1206	
4159	4822 051 10008	0R Jumper 1206	
4162	4822 051 10008	0R Jumper 1206	

COILS & FILTERS

5102	4822 157 71634	MW RF Coil	
5103	4822 157 71635	LW RF Coil	for LW version
5109	4822 242 70665	Ceram Filter 10,7MHz	
5110	4822 242 70665	Ceram Filter 10,7MHz	
5111	4822 158 60511	AM-IF Filter 450kHz	
5112	4822 157 70302	AM-IF Filter 450kHz	
5114	4822 157 70302	AM-IF Filter 450kHz	
5119	4822 157 11443	Discriminator 10,7MHz	
5120	4822 242 82065	Cer. Disc. 10,7MG40K	
5120	4822 242 10251	Cer. Disc.10,7MG61KA-TF21	
5121	4822 242 10261	Quartz 75kHz	
5122	4822 157 60517	Osc. Coil LW	for LW version
5123	4822 157 60517	Osc. Coil MW	
5130	4822 156 30947	RF-Coil 1.5T	
5131	4822 156 30947	RF-Coil 1.5T	

DIODES

6103	4822 130 30621	1N4148	
6104	4822 130 30621	1N4148	
6105	4822 130 83075	HN1V02H-B	
6106	4822 130 30621	1N4148	
6107	4822 130 34488	BZX79-B11	
6120	4822 130 30621	1N4148	not for /21/30/33
6130	4822 130 82833	1SV228	
6131	4822 130 82833	1SV228	

TRANSISTORS & INTEGRATED CIRCUITS

7101	4822 209 90924	TEA5757H/V1	
7102	4822 130 60093	2SA838B	
7103	4822 130 42513	BC858C	for RDS version
7104	5322 130 44779	BC338-40	for LW version
7105	5322 130 44779	BC338-40	for LW version
7109	5322 130 41983	BC858B	for LW version
7111	5322 130 42136	BC848C	
7122	5322 130 42136	BC848C	for LW version
7124	5322 130 42136	BC848C	for LW version

Note: Only the parts mentioned in this list are normal service spare parts.

ELECTRICAL PARTS LIST - TUNER 95 BOARD

MISCELLANEOUS

1102	4822 267 10283	Socket Coaxial IEC 75R
1103	4822 265 31184	JST Connector 2 pin
1110	4822 210 10739	Frontend Assembly FE415-G23

CAPACITORS

2102	4822 124 40433	47µF 20% 25V
2106	4822 125 60102	Trimmer 5,2-30pF 100V
2107	4822 121 51252	470nF 5% 63V
2108	4822 126 13695	82pF 1% 63V
2109	4822 126 13691	27pF 1% 63V
2120	5322 122 32659	33pF 5% 50V
2122	5322 126 10465	3,9nF 10% 50V
2123	4822 121 10766	390pF 1% 630V
2125	4822 121 10578	560pF 1% 630V
2127	4822 122 32927	220nF +80/-20% 50V
2128	4822 124 41579	10µF 20% 50V
2129	4822 124 40242	1µF 20% 63V
2130	4822 126 11585	22nF +80/-20% 25V
2131	4822 122 33325	470nF 16V
2132	4822 122 33325	470nF 16V
2133	4822 124 40242	1µF 20% 63V
2134	4822 126 13188	15nF 5% 63V
2135	4822 122 32927	220nF +80/-20% 50V
2136	4822 126 13188	15nF 5% 63V
2137	4822 122 32927	220nF +80/-20% 50V
2138	4822 124 41576	2,2µF 20% 50V
2139	4822 126 10002	100nF 20% 25V
2140	4822 121 51252	470nF 5% 63V
2141	4822 122 31947	100nF 20% 63V
2142	4822 122 31947	100nF 20% 63V
2143	4822 122 32927	220nF +80/-20% 50V
2144	4822 124 40242	1µF 20% 63V
2145	4822 122 33575	220pF 5% 50V
2147	4822 122 33575	220pF 5% 50V
2148	4822 122 33809	22nF 20% 50V
2150	4822 122 31947	100nF 20% 63V
2151	4822 126 14236	15pF 5% 50V
2152	4822 126 13695	82pF 1% 63V
2158	4822 122 31947	100nF 20% 63V
2160	4822 122 32139	12pF 2% 63V
2161	5322 122 34123	1nF 10% 50V
2162	4822 124 81151	22µF 50V

RESISTORS

3103	4822 051 20008	0R Jumper 0805
3104	4822 051 10102	1k 2% 0,25W
3107	4822 051 20829	82R 5% 0,1W
3108	4822 117 11449	2k2 1% 0,1W
3109	4822 117 11449	2k2 1% 0,1W
3120	4822 051 20008	0R Jumper 0805
3123	4822 051 10008	0R Jumper 1206
3124	4822 051 10008	0R Jumper 1206
3125	4822 116 83864	10k 5% 0,5W
3128	4822 116 52256	2k2 5% 0,5W
3129	4822 051 20008	0R Jumper 0805
3130	4822 051 10008	0R Jumper 1206
3131	4822 051 10008	0R Jumper 1206
3132	4822 051 20008	0R Jumper 0805
3134	4822 051 20223	22k 5% 0,1W
3137	4822 117 10833	10k 1% 0,1W
3138	4822 051 20008	0R Jumper 0805
3139	4822 051 10008	0R Jumper 1206
3140	4822 051 20331	330R 5% 0,1W
3141	4822 117 11148	56k 1% 0,1W
3142	4822 100 11163	Trimmer 100k 30% 0,1W
3143	4822 051 20223	22k 5% 0,1W
3144	4822 051 10102	1k 2% 0,25W
3145	4822 117 11449	2k2 1% 0,1W
3146	4822 051 20479	47R 5% 0,1W
3147	4822 051 10008	0R Jumper 1206
3150	4822 051 20472	4k7 5% 0,1W
3151	4822 051 20683	68k 5% 0,1W
3152	4822 051 20471	470R 5% 0,1W
3153	4822 051 20471	470R 5% 0,1W
3154	4822 116 83872	220R 5% 0,5W
3155	4822 116 52219	330R 5% 0,5W
3158	4822 116 83883	470R 5% 0,5W
3159	4822 116 83883	470R 5% 0,5W
3160	4822 116 83883	470R 5% 0,5W
3161	4822 116 83883	470R 5% 0,5W
3162	4822 117 13579	220k 1% 0,1W
3163	4822 051 10008	0R Jumper 1206
3164	4822 052 10478	⚠ 4R7 5% 0,33W
3165	4822 051 10008	0R Jumper 1206
3167	4822 116 83872	220R 5% 0,5W
3169	4822 051 20008	0R Jumper 0805
3171	4822 051 20008	0R Jumper 0805
3172	4822 051 10008	0R Jumper 1206
3173	4822 051 20008	0R Jumper 0805
3176	4822 051 20008	0R Jumper 0805
3177	4822 051 20223	22k 5% 0,1W
3178	4822 051 10008	0R Jumper 1206
3181	4822 051 10008	0R Jumper 1206
3183	4822 051 10008	0R Jumper 1206
3184	4822 051 10008	0R Jumper 1206
3185	4822 051 10008	0R Jumper 1206
3186	4822 051 10102	1k 2% 0,25W
3188	4822 051 10008	0R Jumper 1206
3192	4822 051 20008	0R Jumper 0805
3197	4822 051 20472	4k7 5% 0,1W

COILS & FILTERS

5102	4822 157 71634	MW Aerial
5103	4822 157 71635	LW Aerial

5107	4822 157 11443	FM Discriminator 10,7MHz
5109	4822 157 71639	Ceram Filter 10,7MHz
5110	4822 242 70665	Ceram Filter 10,7MHz
5111	4822 158 60511	AM-IF Filter 450kHz
5112	4822 157 70302	AM-IF Filter 450kHz
5114	4822 157 70302	AM_IF Filter 450kHz
5115	4822 157 71636	Anti-Birdy Filter
5121	4822 242 10261	X'tal Resonator 75kHZ
5122	4822 157 60517	RF Coil AM
5123	4822 157 60517	RF Coil AM

DIODES

6105	4822 130 83075	HN1V02H-B
6106	4822 130 30621	1N4148
6107	4822 130 34488	BZX79-C11
6120	4822 130 30621	1N4148

TRANSISTORS & INTEGRATED CIRCUITS

7101	4822 209 90315	TEA5762H/V1
7103	4822 130 42513	BC858C
7104	5322 130 44779	BC338-40
7105	5322 130 44779	BC338-40
7109	5322 130 41983	BC858B
7110	5322 130 41983	BC858B
7122	5322 130 42136	BC848C
7124	5322 130 42136	BC848C

Note : Only the parts mentioned in this list are normal service spare parts.

ETF5-FE TAPE MODULE

(Non-Dolby Version)

TABLE OF CONTENTS

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ETF Dolby board layouts 9-6
Analog Circuit diagram 9-7
Servo Circuit diagram 9-8
Exploded views & parts list.. 9-9
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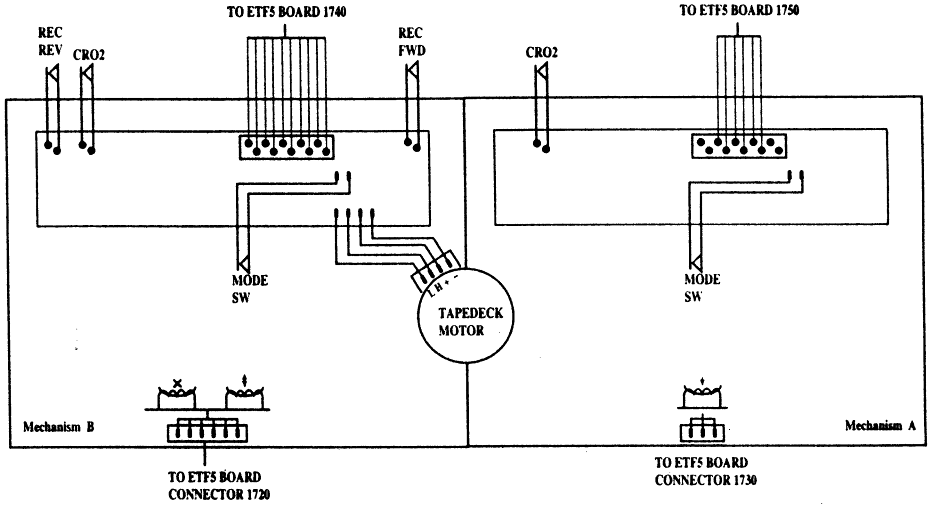
Tapedeck wiring (Double deck)

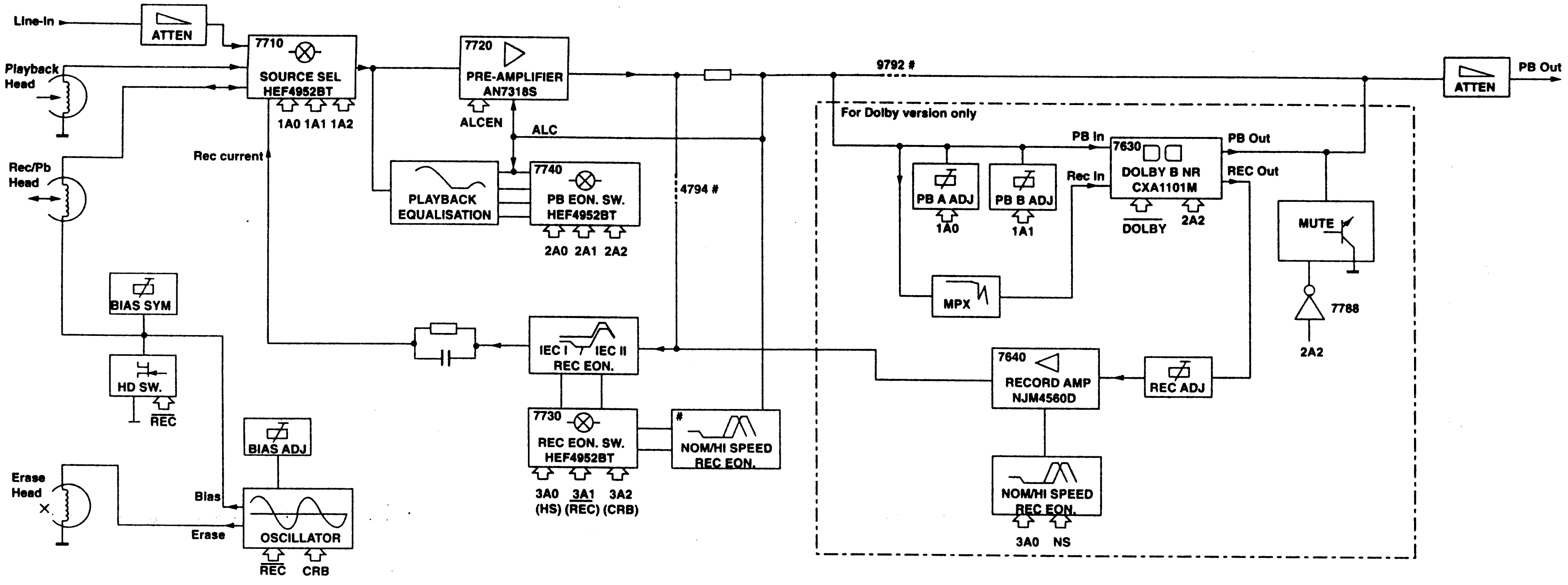

TO ETF5 BOARD 1740
REC REV
CRO2
REC FWD
CRO2
TO ETF5 BOARD 1750
MODE SW
TAPEDECK MOTOR
MODE SW
Mechanism B
Mechanism A
TO ETF5 BOARD CONNECTOR 1720
TO ETF5 BOARD CONNECTOR 1730

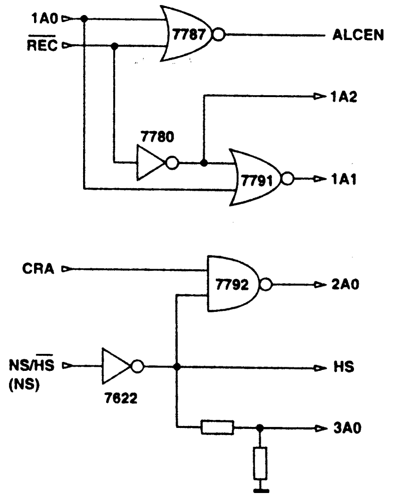
OPTIONS / VARIANTS TABLE

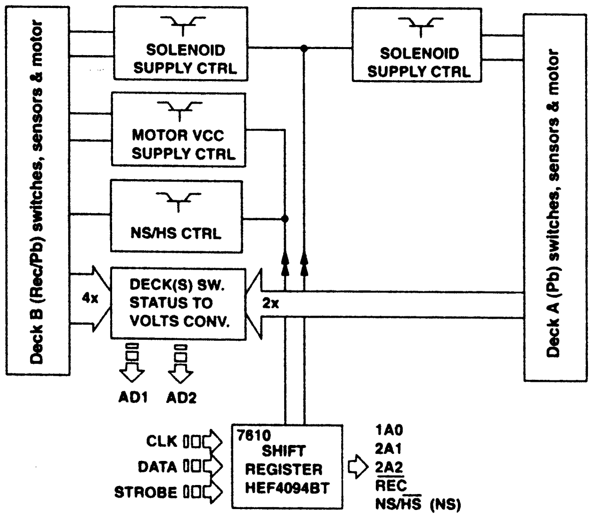
MODULE	ETF5-FE		ETF5A-FE			
VARIANT	1	2	3	4		
NAME	DB/DD/FR	ND/DD/FR	DB/DD/FR	ND/DD/FR		
Deck configuration	double	double	double	double		
Autoreverse	yes (B)	yes (B)	yes (B)	yes (B)		
Auto-replay	no	no	no	no		
Motor configuration	single	single	single	single		
Auto tape type selection	yes	yes	yes	yes		
Dolby B type Noise Reduction	yes	no	yes	no		
19 kHz pilot suppression	yes	no	yes	no		
High speed dubbing	yes	yes	yes	yes		

DB = Dolby B NR
DD = Double Deck
FF = Non-Autoreverse
FR = Autoreverse Deck B
ND = Non-Dolby
SD = Single Deck

BLOCK DIAGRAM


Line-In
ATTEN
Playback Head
Rec/Pb Head
Erase Head
7710
SOURCE SEL
HEF4952BT
1A0 1A1 1A2
Rec current
7720
PRE-AMPLIFIER
AN7318S
ALCEN
ALC
PLAYBACK EQUALISATION
7740
PB EQN. SW.
HEF4952BT
2A0 2A1 2A2
4794 #
9792 #
ATTEN
PB Out
For Dolby version only
PB In
7630
DOLBY B NR
CXA1101M
PB Out
Rec In
REC Out
PB A ADJ
1A0
PB B ADJ
1A1
DOLBY
2A2
MUTE
7788
2A2
MPX
BIAS SYM
HD SW.
REC
IEC I
IEC II
REC EQN.
7640
RECORD AMP
NJM4560D
REC ADJ
BIAS ADJ
7730
REC EQN. SW.
HEF4952BT
3A0 3A1 3A2
(HS) (REC) (CRB)
#
NOM/HI SPEED REC EQN.
NOM/HI SPEED REC EQN.
3A0 NS
Bias
Erase
OSCILLATOR
REC CRB


1A0
REC
7787
ALCEN
1A2
7780
7791
1A1
CRA
7792
2A0
NS/HS
(NS)
7622
HS
3A0


Deck B (Rec/Pb) switches, sensors & motor
SOLENOID SUPPLY CTRL
SOLENOID SUPPLY CTRL
Deck A (Pb) switches, sensors & motor
MOTOR VCC SUPPLY CTRL
NS/HS CTRL
4x
DECK(S) SW. STATUS TO VOLTS CONV.
2x
AD1 AD2
CLK
DATA
STROBE
7610
SHIFT REGISTER
HEF4094BT
1A0
2A1
2A2
REC
NS/HS (NS)

NOTE: # For Non-dolby version only
Only 1 channel is presented.

▯▯⇨ MicroProcessor Control / Communication lines

⇨ Direct / Indirect Control lines from Shift Registers

Brief introduction

General

1. Playback Mode
Signal from the playback head Deck A or Deck B is selected and fed through by the Mode Selector IC7710 (HEF4952B). The signal is amplified by amplifier IC7720 (AN7318S) before feeding to the IC7740 (HEF4952B) and out to the AF Board via connector 1701. For Dolby sets the signal from IC7740 will pass through IC7630 (CXA1551M) for dolby noise processing before going to the connector 1701.

2. Recording Mode
Recording Signal is selected and fed through by the Mode Selector IC7710 (HEF4952B) which is then amplified by the amplifier IC7720 (AN7318S). The amplified output signal will pass through IC7730 (HEF4952B) for record equalization and back to IC7710 (HEF4952B) before registered into the Rec/PB Head of Deck B. For Dolby sets the amplified wll pass through IC7630 (CXA1551M) for dolby noise processing, amplified to the right level by IC7640 (NJM4560M) before record equalization.

3. Dubbing Mode
In Dubbing mode, signal from the playback head Deck A is selected and fed through by the Mode Selector IC7710 (HEF4952B) which is then equalised for playback mode by the amplifier IC7720 (AN7318S) so that a flat response is obtained after the pre-amp. The equalised signal will then follow the same path as in the Recording mode.

4. Mode Selector
The Mode Selector IC7710 (HEF4952B) caters for 4 inputs signal, namely Playback Signal from Deck A, Playback Signal from Deck B, Recording Signal and Dubbing Signal.

5. Amplifier PB/REC
Amplifier IC7720 (AN7318S) is for the purpose of amplifying the Playback and Recording signal from the Mode Selector.

6. Automatic Level Control (ALC)
ALC circuit consists of resistors (3760, 3765, 3766, 3767), capacitors (2762 , 2763) and control by transistor 7787 (BC847B). ALC limits the amplifier output to a constant value when input signal becomes too large, thus limiting recording current to below saturation level, to prevent recording distortion.

7. Muting Circuit (For Non-Dolby only)
Switch S4 of the IC7740 (HEF4952B) is for the purpose of muting the output during Recording mode. During Recording mode, S4 is closed and shorted to the ground.

8. IC7740 (HEF4952B)
The function of the IC7740 (HEF4952B) is to change time constant between 120us Ferro (IEC I) and 70us Chrome (IEC II) during playback mode. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II). This IC will switch to Flat Gain during the Recording mode.

9. IC7730 (HEF4952B)
The function of the IC7730 (HEF4952B) is to change gain and time constant according to tape type and recording speed to boost recording current at higher frequency during recording to compensate for head loss. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II).

10. Bias Level
Bias Level making use of the Variable resistor (3773) for adjusting the optimal level of the bias current for Ferro or Chrome.

11. Bias Symm (For Dolby only)
Bias Symm making use of the Variable resistor (3785) to adjust the bias current for the left and the right channel to be equal.

12. PB Switch
Playback Switch which consists of the FETs 7785 (For Dolby only) & 7786 (J111) is for the purpose of providing a virtual ground for the Rec/PB Head (Deck B) during Playback mode. During the Playback mode, the FETs are turn on and shorted pin 2 and 4 of connector 1720 to the ground. During Recording mode, the FETs are turn off to allow the oscillator signal to be superposition onto the Recording signal for recording.

13. Muting Circuit
The muting circuit which consists of transistors 7788, 7789 and 7790 (BC847B) is for the purpose of muting the output during Recording mode.

14. Motor Speed
During High speed dubbing, a feedback signal from the uP through pin 03 of the IC7610 (HEF4094BT) will trigger the transistors 7622 (BC847B) and 7616 (BC857B) to cause a change in the voltage level between High and Low, thus changing the speed of the motor.

15. IC7610 (HEF4094BT)
IC7610 (HEF4094BT) is a Shift Register use for issues the logic for cmos switch ICs (HEF4952B) via 1A0, 2A1 and 2A2. It also issues logic to On/Off SOL_A, SOL_B and MOT. Recording speed is controlled via NS/HS.

Dolby Circuit (For sets with Dolby B NR only)

16. IC7630 (CXA1551M)
IC7630 (CXA1551M) in the Dolby circuit is a Dolby Noise Reduction Type B IC for the Playback and Recording signal. Noise Reduction ON/OFF are controlled by $\overline{\text{DOLBY}}$, which is from CLK, direct from uP. After clocking in DATA, CLK is set to HIGH/LOW for NR OFF/ON.

17. 19kHz Filter
The 19kHz filters 5631 & 5632 (LXD-210) in the Dolby circuit is for the purpose of filtering the 19kHz Pilot Tone (for Tuner signal only) of the Recording signal.

18. Level Adjust
The Variable resistor 3635, 3636,3641 and 3642 in the Dolby circuit is for adjusting the playback level of the Dolby reference (400Hz , 200nWb/m). Transistor 7631, 7632 are ON to enable adjustment of 3641, 3642 during Playback Deck A. Transistor 7633, 7634 and 3635, 3636 are active for Playback Deck B.

19. Amplifier IC7640 (NJM4560M)
The Amplifiers 7640A & 7640B (NJM4560M) in the Dolby circuit is for the purpose of amplified the Recording signal.

NOTATIONS & ABBREVIATIONS USED IN THIS DOCUMENT

CR	Chrome (IEC type II)
DB	Dolby NR type B
DD	Double Deck
DM	Double Motor
FE	Ferro (IEC type I)
FF	Non Auto Reverse
FR	Auto Reverse on Deck B
Gnd x	Ground x
HSD	High speed dubbing
ND	Non Dolby
NR	Noise Reduction
NSD	Normal speed dubbing
PB	Playback
REC	Record
S/A	Sub-assy
SD	Single Deck
SM	Single Motor

CONNECTORS ASSIGNMENTS:

CONNECTOR 1701 INTERCONNECTION TO AF BOARD

O	1	REC-L	Record input left
O	2	REC-R	Record input right
O	3	GND A	AF Ground
O	4	TAPE-L	Playback output left
O	5	+12V	D.C. supply (+12V) in
O	6	TAPE-R	Playback output right
O	7	-CMOS	Negative d.c. supply (-9V) for CMOS ICs

CONNECTOR 1703 INTERCONNECTION TO AF BOARD

O	1	GND M	Motor Ground
O	2	+MOTOR	D.C. supply (+12V) for tape deck motor & solenoid

CONNECTOR 1706 INTERCONNECTION TO FRONT BOARD

O	1	AD2	Deck sensing switches output voltage / Deck A EOT
O	2	AD1	Deck sensing switches output voltage / Deck B EOT
O	3	+5	DC supply +5V for ADC network
O	4	GND P	Control & Oscillator Ground
O	5	CLK	HEF4094BT shift register Clock line
O	6	DATA	HEF4094BT shift register Data line
O	7	STROBE	HEF4094BT shift register Strobe line

CONNECTOR 1710 DECK B HEADS CONNECTON *(For ETF6... only)*

O	1	B R/P HD L+	R/P Head left channel positive
O	2	GND A	R/P Head return ground
O	3	B R/P HD R+	R/P Head right channel positive
O	4	ERASE HEAD	Erase Head
O	5	GND A	Erase Head ground

CONNECTOR 1720 DECK B HEADS CONNECTON *(For ETF5... only)*

O	1	B R/P HD L+	R/P Head left channel positive
O	2	B R/P HD L-	R/P Head left channel negative
O	3	B R/P HD R+	R/P Head right channel positive
O	4	B R/P HD R-	R/P Head right channel negative
O	5	ERASE HEAD	Erase Head
O	6	GND A	Erase Head ground

CONNECTOR 1730 DECK A HEAD CONNECTIONS *(For Double Deck versions only)*

O	1	A PB HD L+	Pb Head left channel positive
O	2	GND A	Pb Head return ground shield
O	3	A PB HD R+	Pb Head right channel positive

CONNECTOR 1740 DECK B CONTROL INTERFACE *(For ETF5... Double Deck only)*

O	1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
O	2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
O	3	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
O	4	PHOTO B	Photo sensor output (tape movement indication)	
O	5	SOL B	Solenoid supply	
O	6	Vcc	Deck / Motor supply	
O	7	MODE	Mode switch (head engagement)	[open=off: close=engaged]
O	8	GND M	Deck / Motor ground	
O	9	H	H pin for motor	
O	10	L	L pin for motor	

CONNECTOR 1750 DECK A CONTROL INTERFAC *(For ETF5... Double Deck only)*

O	1	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
O	2	PHOTO A	Photo sensor output (tape movement indication)	
O	3	SOL A	Solenoid supply	
O	4	Vcc	Deck/Motor supply	
O	5	MODE	Mode switch (head engagement)	[open=off: close=engaged]
O	6	GND M	Deck/Motor ground	

CONNECTOR 1760 DECK B CONTROL INTERFACE *(For Single Deck only)*

O	1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
O	2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
O	3	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
O	4	PHOTO B	Photo sensor output (tape movement indication)	
O	5	SOL B	Solenoid supply	
O	6	Vcc	Deck / Motor supply	
O	7	MODE	Mode switch (head engagement)	[open=off: close=engaged]
O	8	GND M	Deck / Motor ground	

CONNECTOR 1770 DECK A & B CONTROL INTERFACE *(For ETF6... only)*

O	1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
O	2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
O	3	CrO2 B	Chrome tape detection switch deck B	[open=Cr: close=Fe]
O	4	PHOTO B	Photo sensor output (tape movement indication)	
O	5	SOL B	Solenoid supply for deck B	
O	6	Vcc	Deck / Motor supply	
O	7	MODE B	Mode switch (head engagement)	[open=off: close=engaged]
O	8	GND M	Deck / Motor ground	
O	9	L	L pin for motor	
O	10	H	H pin for motor	
O	11	CrO2 A	Chrome tape detection switch deck A	[open=Cr: close=Fe]
O	12	SOL A	Solenoid supply for deck A	
O	13	PHOTO A	Photo sensor output (tape movement indication)	

TAPE MECHANISM A ELECTRONICS

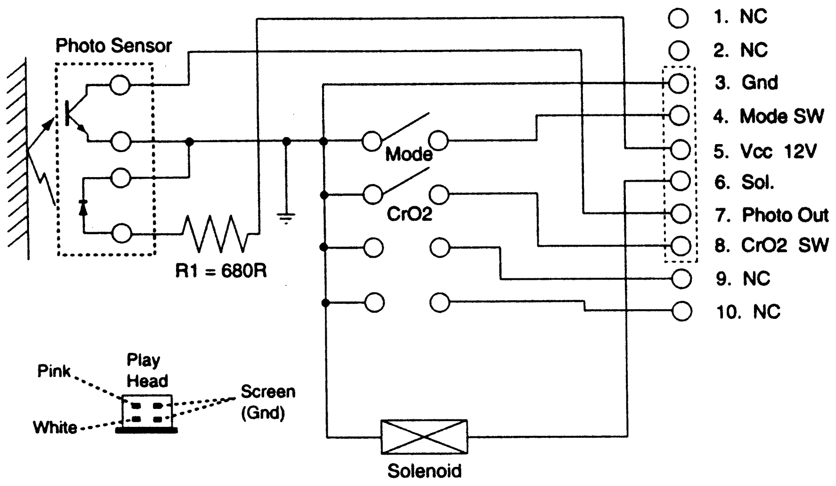
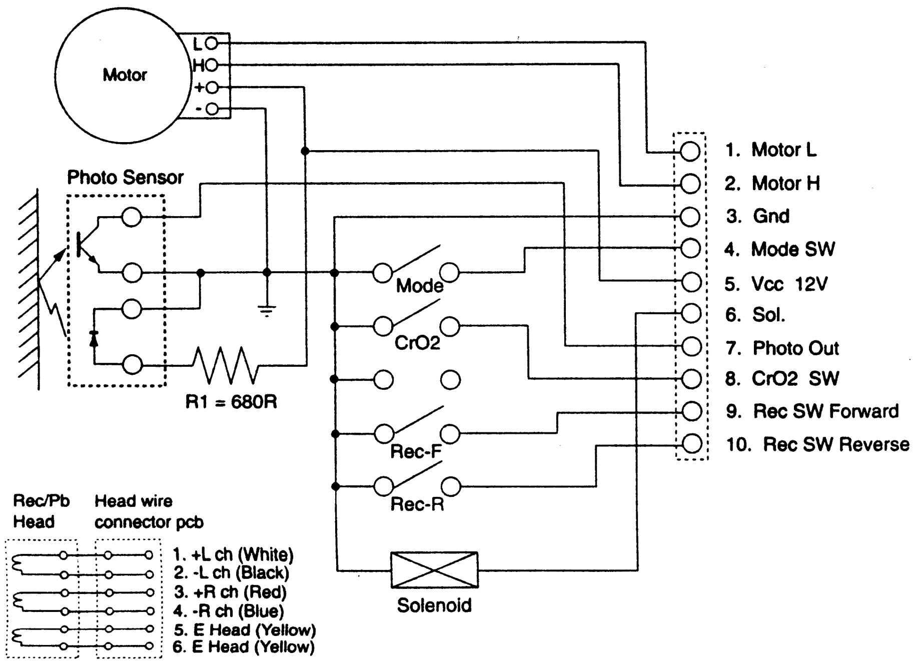


Photo Sensor
R1 = 680R
Mode
CrO2
Pink
Play Head
White
Screen (Gnd)
Solenoid
1. NC
2. NC
3. Gnd
4. Mode SW
5. Vcc 12V
6. Sol.
7. Photo Out
8. CrO2 SW
9. NC
10. NC

TAPE MECHANISM B ELECTRONICS


Motor
L
H
+
-
Photo Sensor
R1 = 680R
Mode
CrO2
Rec-F
Rec-R
Solenoid
1. Motor L
2. Motor H
3. Gnd
4. Mode SW
5. Vcc 12V
6. Sol.
7. Photo Out
8. CrO2 SW
9. Rec SW Forward
10. Rec SW Reverse
Rec/Pb Head
Head wire connector pcb
1. +L ch (White)
2. -L ch (Black)
3. +R ch (Red)
4. -R ch (Blue)
5. E Head (Yellow)
6. E Head (Yellow)

TAPE ADJUSTMENT & CHECK TABLE

	TEST CASSETTE	RECORDER MODE	MEASURE ON	READ ON	ADJUST	
					with	to
ADJUST MOTOR SPEED						
NORMAL SPEED	SBC420 3150Hz	PLAY B	◇1 or ◇2 LEFT RIGHT	frequency counter	3620	3150Hz ± 0.5%
		PLAY A			check	3150Hz -0.8/+1.8%
CHECK WOW & FLUTTER						
DECK A & B	SBC420 3150Hz	PLAY	◇1 or ◇2 LEFT RIGHT	W&F-meter	check	≤0.4 % DIN
ADJUST AZIMUTH						
DECK A & B	SBC420 10kHz	PLAY FWD	◇1 or ◇2 LEFT RIGHT	mV-meter	left hand screw	max. output level & left=right
		PLAY REV #			right hand screw	
CHECK PLAYBACK FREQUENCY RESPONSE						
DECK A & B	SBC420	PLAY	◇1 or ◇2 LEFT RIGHT	mV-meter	check	limits see fig.1
ADJUST BIAS CURRENT						
DECK B	SBC419A	RECORD	◇5 or ◇6 LEFT RIGHT	mV-meter	3773	995mV
	SBC420				check	750mV ± 1.5dB
CHECK OVERALL FREQUENCY RESPONSE AND DISTORTION						
Inject 3mV signals 100Hz, 250Hz, 1kHz, 10kHz, 12.5kHz via ◇3 or ◇4	SBC419A or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	◇1 or ◇2 LEFT RIGHT	mV-meter	check	limits see fig. 2 *
Inject 1kHz 8.85mV via ◇3 or ◇4	SBC419A or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	◇1 or ◇2 LEFT RIGHT	THD-meter	check	≤3% *

SBC419A : 4822 397 30069
SBC420 : 4822 397 30071

# For Auto-reverse version only
* If high frequencies are not within limits, decrease bias and re-measure. If distortion is too high, increase bias and re-meaure

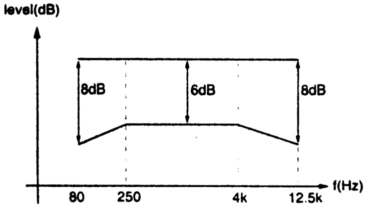


figure. 1

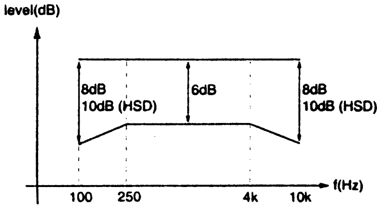
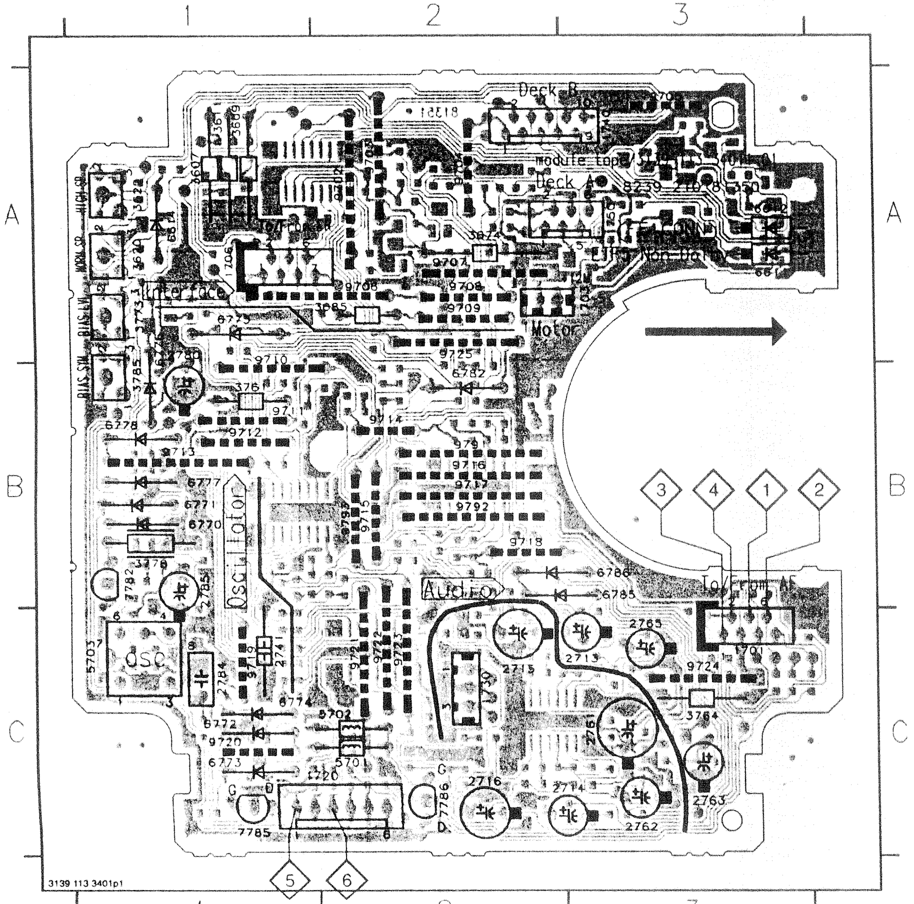


figure. 2

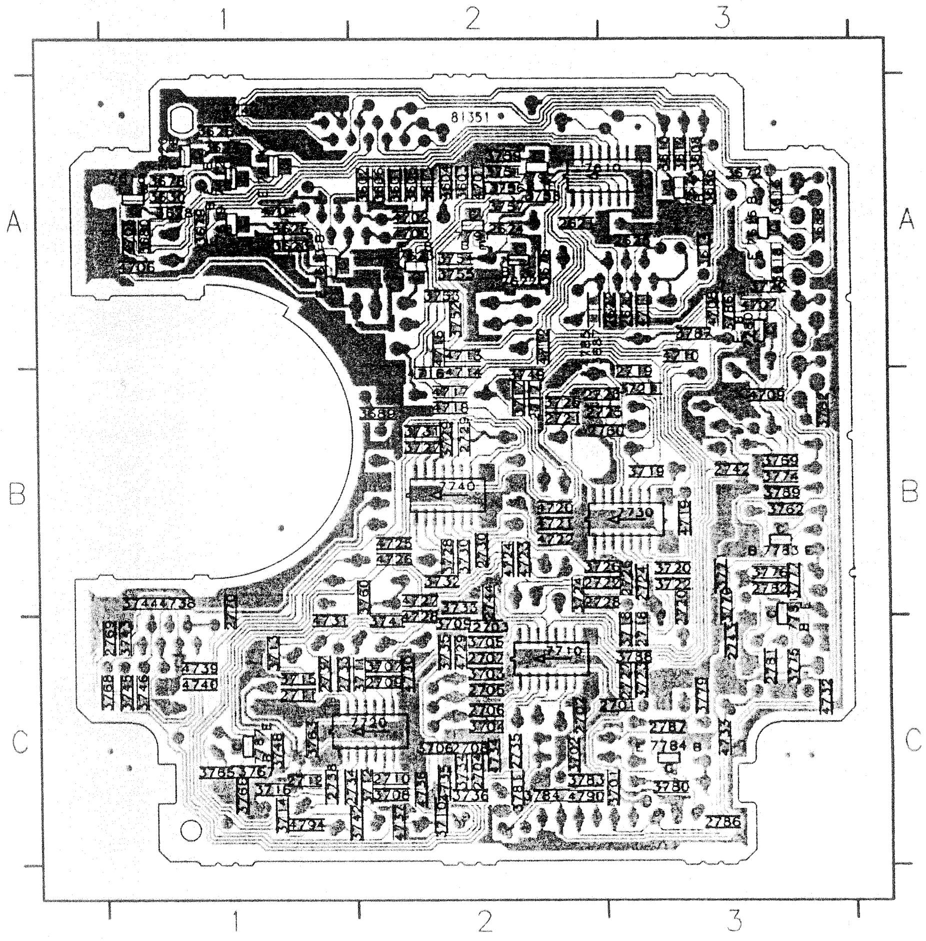
COMPONENT LAYOUT

1701	C3	2715	C2	2785	B1	3764	C3	6614	A1	6778	B1	9704	A2	9713	B1	9722	C2
1703	A3	2716	C2	3607	A1	3773	A1	6770	B1	6782	B2	9705	A3	9714	B2	9723	C2
1706	A1	2741	C1	3609	A1	3778	B1	6771	B1	6785	B3	9706	A2	9715	B2	9724	C3
1720	C2	2761	C3	3611	A1	3785	B1	6772	C1	6786	B3	9707	A2	9716	B2	9725	A2
1730	C2	2762	C3	3620	A1	5701	C2	6773	C1	7782	B1	9708	A2	9717	B2	9791	B2
1740	A3	2763	C3	3622	A1	5702	C2	6774	C1	7785	C1	9709	A2	9718	B2	9792	B2
1750	A3	2765	C3	3674	A2	5703	C1	6775	A1	7786	C2	9710	A1	9719	C1	9793	B2
2713	C3	2780	A1	3685	A2	6611	A3	6776	A1	9702	A2	9711	B1	9720	C1		
2714	C3	2784	C1	3761	B1	6612	A3	6777	B1	9703	A2	9712	B1	9721	C2		

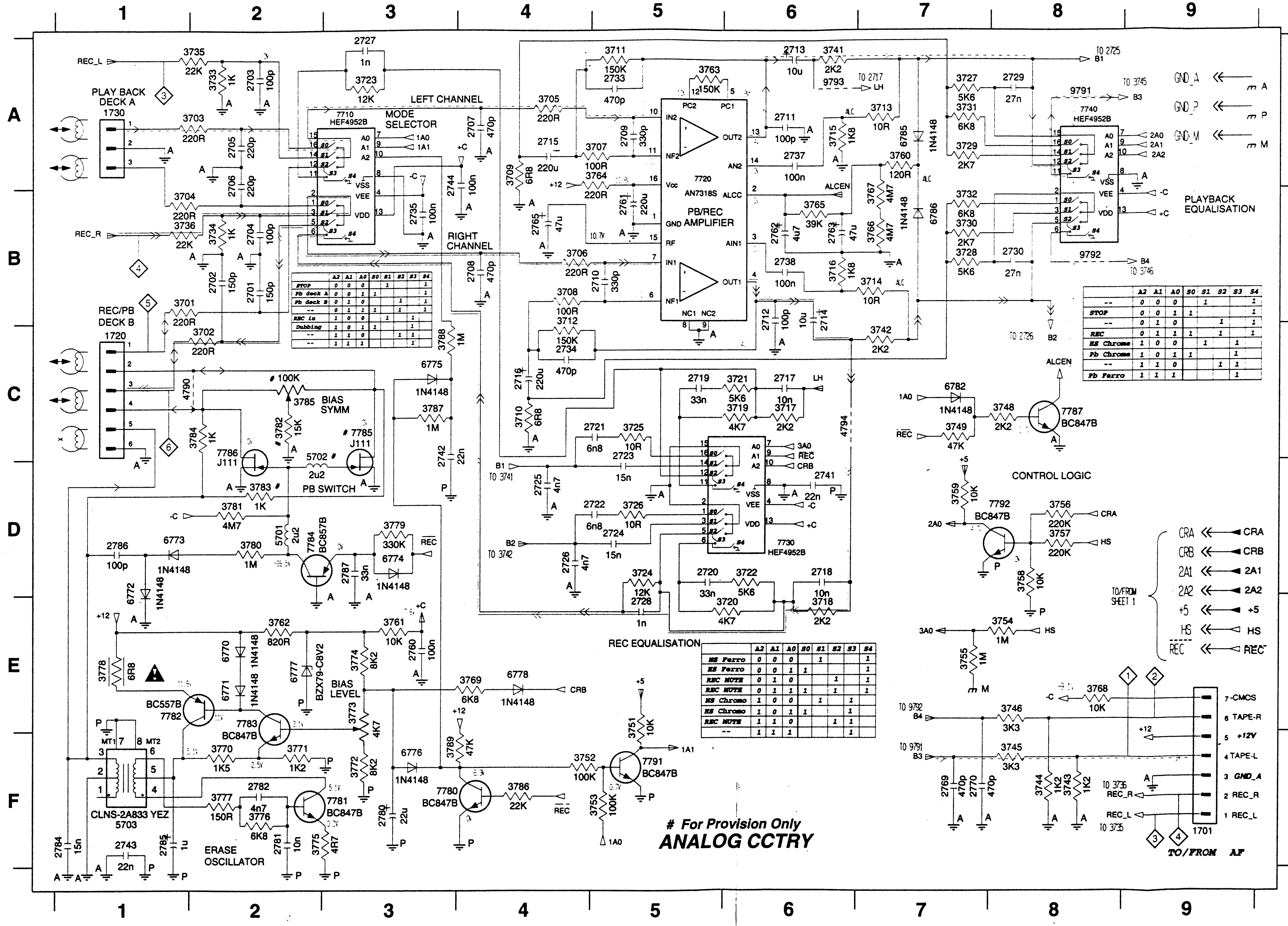


CHIP LAYOUT

2621	A2	2725	B3	3605	A2	3702	C2	3727	B2	3758	A2	3788	C3	4724	B2	7616	A3
2622	A3	2726	B3	3606	A2	3703	C2	3728	B2	3759	A2	3789	B3	4725	B2	7618	A1
2623	A3	2727	C3	3608	A3	3704	C2	3729	B2	3760	B2	4701	A2	4726	B2	7619	A1
2624	A2	2728	B2	3610	A3	3705	C2	3730	B2	3762	B3	4702	A2	4727	B2	7620	A1
2625	A3	2729	B2	3612	A3	3706	C2	3731	B2	3763	C1	4703	A2	4728	C2	7622	A2
2701	C3	2730	B2	3613	A2	3707	C2	3732	B2	3765	C1	4704	A1	4729	C2	7623	A2
2702	C2	2733	C1	3614	A3	3708	C2	3733	B2	3766	C1	4705	A1	4730	C2	7624	A3
2703	C2	2734	C1	3616	A3	3709	C2	3734	C2	3767	C1	4706	A1	4731	C1	7710	C2
2704	C2	2735	C2	3618	A3	3710	C2	3735	C2	3768	C1	4707	A3	4732	C3	7720	C2
2705	C2	2737	C1	3623	A1	3711	C2	3736	C2	3769	B3	4708	A3	4733	C3	7730	B3
2706	C2	2738	C1	3624	A1	3712	C2	3741	C2	3770	B3	4709	B3	4734	C2	7740	B2
2707	C2	2742	B3	3625	A1	3713	C1	3742	C1	3771	B3	4710	A3	4735	C2	7780	A3
2708	C2	2743	C3	3626	A1	3714	C1	3743	C1	3772	A3	4711	A3	4736	C2	7781	B3
2709	C2	2744	B2	3628	A1	3715	C1	3744	B1	3774	B3	4712	A2	4737	C2	7783	B3
2710	C2	2760	B3	3630	A1	3716	C1	3745	C1	3775	C3	4713	A2	4738	B1	7784	C3
2711	C1	2769	C1	3672	A3	3717	B2	3746	C1	3776	B3	4714	B2	4739	C1	7787	C1
2712	C1	2770	B1	3676	A2	3718	C3	3748	C1	3777	B3	4715	A2	4740	C1	7791	A2
2717	B2	2781	C3	3678	A1	3719	B3	3749	B2	3779	C3	4716	B2	4743	A1	7792	A2
2718	C3	2782	B3	3679	A1	3720	B3	3751	A2	3780	C3	4717	B2	4785	A2		
2719	B3	2786	C3	3680	A1	3721	B3	3752	A2	3781	C2	4718	B2	4790	C2		
2720	B3	2787	C3	3686	A3	3722	B3	3753	A2	3782	B3	4719	B3	4794	C1		
2721	B2	3601	A2	3687	A2	3723	C3	3754	A2	3783	C2	4720	B2	7610	A3		
2722	B2	3602	A2	3688	A3	3724	B2	3755	A2	3784	C2	4721	B2	7612	A1		
2723	B2	3603	A2	3689	B2	3725	B2	3756	A2	3786	A3	4722	B2	7613	A1		
2724	B3	3604	A2	3701	C3	3726	B2	3757	A2	3787	A3	4723	B2	7614	A1		



ANALOG CIRCUIT


1 2 3 4 5 6 7 8 9
A B C D E F
REC_L
PLAY BACK DECK A
1730
REC_R
REC/PB DECK B
1720
3735 22K
3733 1K
2703 100p
3703 220R
2705 220p
2706 220p
3704 220R
3736 22K
3734 1K
2704 100p
2702 150p
2701 150p
3701 220R
3702 220R
4790
2727 1n
3723 12K
LEFT CHANNEL
7710 HEF4952B
MODE SELECTOR
RIGHT CHANNEL
1A0
1A1
2707 470p
2708 470p
2744 100n
2735 100n
3705 220R
2715 220u
3707 100R
3764 220R
3709 6R8
2765 47u
3706 220R
2709 330p
2710 330p
2761 220u
3711 150K
2733 470p
3763 150K
7720 AN7318S
PB/REC AMPLIFIER
IN2 NF2 Vcc RF IN1 NF1 GND OUT2 OUT1 AN2 ALCC AIN1 PC2 PC1 NC1 NC2
3708 100R
3712 150K
2734 470p
2716 220u
3710 6R8
2713 10u
3741 2K2
TO 2725 B1
TO 2717 LH
9793
2711 100p
3715 1K8
3713 10R
2737 100n
3760 120R
ALCEN
3765 39K
2762 4u7
2763 47u
3767 4M7
3766 4M7
2738 100n
3716 1K8
3714 10R
2712 100p
2714 10u
3742 2K2
6785 1N4148
6786 1N4148
3727 5K6
2729 27n
3731 6K8
3729 2K7
3732 6K8
3730 2K7
3728 5K6
2730 27n
9791
TO 3745 B3
9792
B4 TO 3746
7740 HEF4952B
2A0 2A1 2A2
PLAYBACK EQUALISATION
GND_A GND_P GND_M
TO 2726 B2
3785 # 100K BIAS SYMM
3782 # 15K
3784 1K
7786 J111
# 7785 J111
5702 # 2u2
PB SWITCH
3783 # 1K
6775 1N4148
3787 1M
3788 1M
2742 22n
3781 4M7
2786 100p
6773 1N4148
3780 1M
5701 2u2
7784 BC857B
3779 330K
6774 1N4148
2787 33n
6772 1N4148
3778 6R8
3762 820R
6770 1N4148
6771 1N4148
6777 BZX79-C8V2
3774 8K2
BIAS LEVEL
3773 4K7
3772 8K2
3761 10K
2760 100n
BC557B 7782
7783 BC847B
3770 1K5
3771 1K2
MT1 MT2
CLNS-2A833 YEZ 5703
3777 150R
2782 4n7
3776 6K8
7781 BC847B
2781 10n
3775 4R7
ERASE OSCILLATOR
2784 15n
2743 22n
2785 1u
3769 6K8
6778 1N4148
CRB
6776 1N4148
2780 22u
3789 47K
7780 BC847B
3786 22K
3752 100K
3753 100K
3751 10K
7791 BC847B
B1 TO 3741
2725 4n7
2721 6n8
3725 10R
2723 15n
2722 6n8
3726 10R
2724 15n
B2 TO 3742
2726 4n7
2719 33n
3721 5K6
3719 4K7
2717 10n
3717 2K2
LH
7730 HEF4952B
3A0 REC CRB
2741 22n
2720 33n
3722 5K6
3720 4K7
2718 10n
3718 2K2
3724 12K
2728 1n
REC EQUALISATION
4794
6782 1N4148
3748 2K2
3749 47K
7787 BC847B
CONTROL LOGIC
3759 10K
7792 BC847B
3756 220K
3757 220K
3758 10K
CRA HS
3754 1M
3755 1M
TO/FROM SHEET 1
CRA CRB 2A1 2A2 +5 HS REC
3768 10K
3746 3K3
3745 3K3
TO 9792 B4
TO 9791 B3
2769 470p
2770 470p
3744 1K2
3743 1K2
TO 3736 REC_R
TO 3735 REC_L
1701
7-CMCS 6 TAPE-R 5 +12V 4 TAPE-L 3 GND_A 2 REC_R 1 REC_L
TO/FROM AF
# For Provision Only
ANALOG CCTRY

	A2	A1	A0	S0	S1	S2	S3	S4
STOP	0	0	0		1			1
Pb deck A	0	0	1	1				1
Pb deck B	0	1	0			1		1
--	0	1	1	1		1		1
REC in	1	0	0		1		1	
Dubbing	1	0	1	1			1	
--	1	1	0			1	1	
--	1	1	1				1	

	A2	A1	A0	S0	S1	S2	S3	S4
--	0	0	0		1			1
STOP	0	0	1	1				1
--	0	1	0			1		1
REC	0	1	1	1		1		1
HS Chrome	1	0	0		1		1	
Pb Chrome	1	0	1	1			1	
--	1	1	0			1	1	
Pb Ferro	1	1	1				1	

	A2	A1	A0	S0	S1	S2	S3	S4
NS Ferro	0	0	0		1			1
HS Ferro	0	0	1	1				1
REC MUTE	0	1	0			1		1
REC MUTE	0	1	1	1		1		1
NS Chromo	1	0	0		1		1	
HS Chromo	1	0	1	1			1	
REC MUTE	1	1	0			1	1	
--	1	1	1				1	

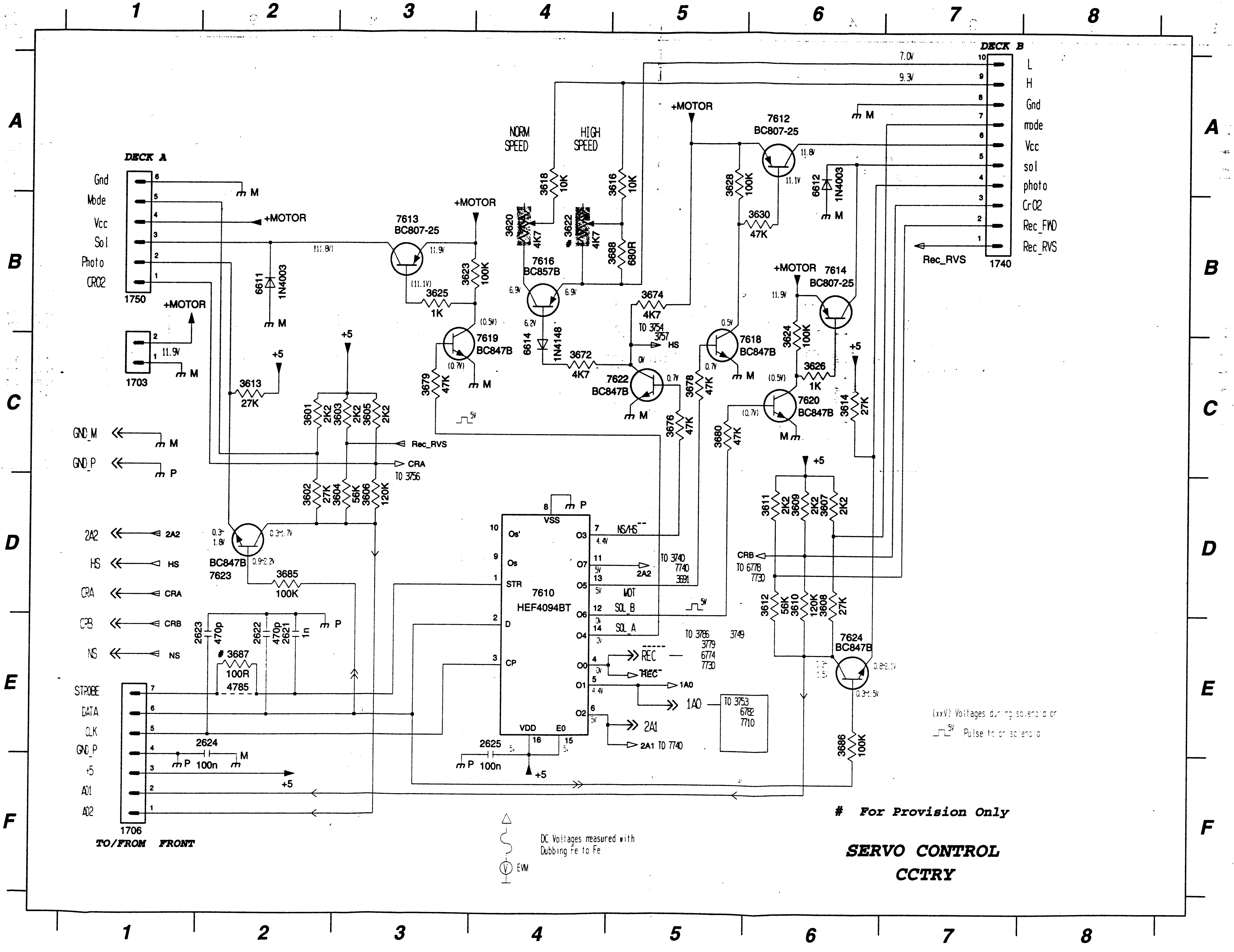
- ->- Signal path Pb left channel

—>>— Signal path REC right channel

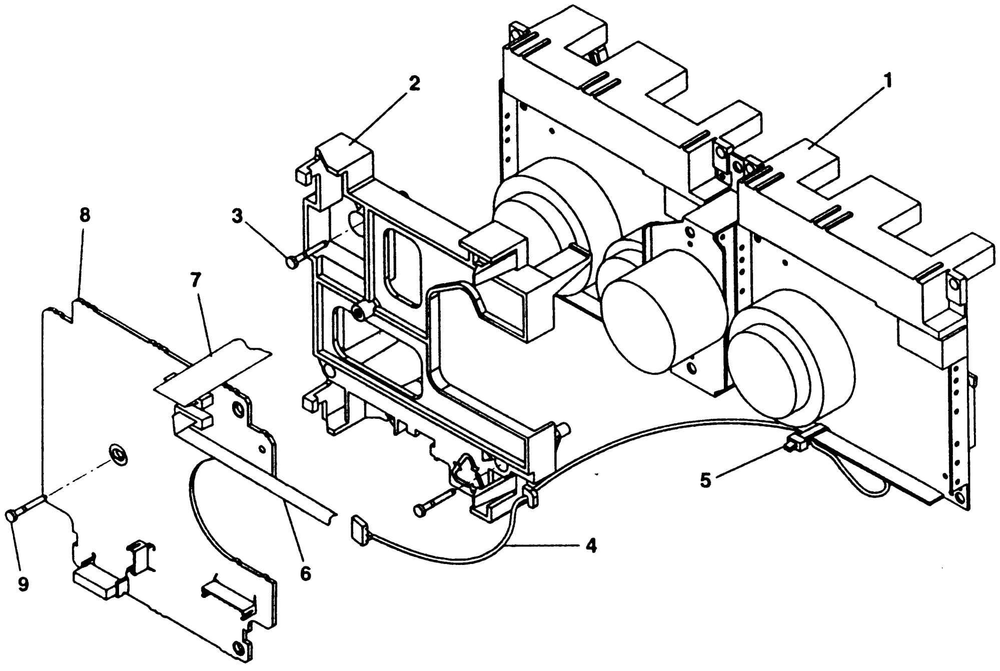
DC Voltages measured with Dubbing Fe to Fe

1701	F9
1720	C1
1730	A1
2701	B2
2702	B2
2703	A2
2704	B2
2705	A2
2706	A2
2707	A4
2708	B4
2709	A5
2710	B5
2711	A6
2712	B6
2713	A6
2714	B6
2715	A4
2716	C4
2717	C6
2718	D6
2719	C5
2720	D5
2721	C5
2722	D5
2723	C5
2724	D5
2725	D4
2726	D4
2727	A3
2728	E5
2729	A8
2730	B8
2733	A5
2734	C4
2735	B3
2737	A6
2738	B6
2741	D6
2742	C3
2743	F1
2744	A3
2760	E3
2761	B5
2762	B6
2763	B6
2765	B4
2769	F7
2770	F7
2780	F3
2781	F2
2782	F2
2784	F1
2785	F1
2786	D1
2787	D3
3701	B1
3702	C2
3703	A2
3704	B1
3705	A4
3706	B4
3707	A5
3708	B4
3709	A4
3710	C4
3711	A5
3712	C4
3713	A7
3714	B7
3715	A6
3716	B6
3717	C6
3718	E6
3719	C6
3720	E6
3721	C6
3722	D6
3723	A3
3724	D5
3725	C5
3726	D5
3727	A7
3728	B7
3729	A7
3730	B7
3731	A7
3732	B7
3733	A2
3734	B2
3735	A2
3736	B1
3741	A6
3742	C7
3743	F8
3744	F8
3745	F8
3746	E8
3748	C8
3749	C7
3751	E5
3752	F4
3753	F5
3754	E8
3755	E7
3756	D8
3757	D8
3758	D8
3759	D7
3760	A7
3761	E3
3762	E2
3763	A5
3764	A5
3765	B6
3766	B7
3767	B7
3768	E8
3769	E4
3770	F2
3771	F2
3772	F3
3773	E3
3774	E3
3775	F2
3776	F2
3777	F2
3778	E1
3779	D3
3780	D2
3781	D2
3782	C2
3783	D2
3784	C2
3785	C2
3786	F4
3787	C3
3788	C3
3789	F3
4790	C1
4794	
5701	
5702	
5703	
6770	
6771	
6772	
6773	
6774	
6775	
6776	
6777	
6778	
6782	
6785	
6786	
7710	
7720	
7730	
7740	
7780	
7781	
7782	
7783	
7784	
7785	
7786	
7787	
7791	
7792	
9791	
9792	
9793	

SERVO CONTROL CIRCUIT


1
2
3
4
5
6
7
8
A
B
C
D
E
F
DECK A
Gnd
Mode
Vcc
Sol
Photo
CRO2
1750
1703
11.9V
+MOTOR
M
P
+5
3613
27K
6611
1N4003
7613
BC807-25
11.9V
(11.1V)
3625
1K
3623
100K
7619
BC847B
(0.5V)
(0.7V)
3679
47K
3601 2K2
3603 2K2
3605 2K2
Rec_RVS
CRA
TO 3756
3602 27K
3604 56K
3606 120K
GND_M
GND_P
2A2
HS
CRA
CRB
NS
BC847B
7623
3685
100K
2623 470p
2622 470p
2621 1n
# 3687
100R
4785
STROBE
DATA
CLK
GND_P
+5
A01
A02
1706
TO/FROM FRONT
2624
100n
2625
100n
7610
HEF4094BT
VSS
VDD
E0
Os'
Os
STR
D
CP
O3
O7
O5
O6
O4
O0
O1
O2
NS/HS
MOT
SOL_B
SOL_A
TO 3740
7740
3691
REC
REC
1A0
2A1
2A1 TO 7740
TO 3753
6782
7710
TO 3765
3779
6774
7730
3749
NORM SPEED
HIGH SPEED
3618
10K
3616
10K
3620
4K7
# 3622
4K7
3688
680R
7616
BC857B
6.9V
6.2V
6614
1N4148
3672
4K7
7622
BC847B
3674
4K7
TO 3754
3757
HS
3676
47K
3678
47K
7612
BC807-25
11.8V
11.1V
3628
100K
3630
47K
6612
1N4003
7618
BC847B
7614
BC807-25
3624
100K
3626
1K
7620
BC847B
3614
27K
3680
47K
3611 2K2
3609 2K2
3607 2K2
CRB
TO 6778
7730
3612 56K
3610 120K
3608 27K
7624
BC847B
3686
100K
DECK B
7.0V
9.3V
L
H
Gnd
mode
Vcc
sol
photo
CrO2
Rec_FWD
Rec_RVS
1740
(xxV) Voltages during solenoid on
5V Pulse to on solenoid
DC Voltages measured with Dubbing Fe to Fe
EVM
# For Provision Only
SERVO CONTROL CCTRY

1703	C1
1706	F1
1740	B7
1750	B1
2621	E2
2622	E2
2623	E2
2624	E2
2625	E4
3601	C2
3602	D2
3603	C3
3604	D3
3605	C3
3606	D3
3607	D6
3608	D6
3609	D6
3610	D6
3611	D6
3612	D6
3613	C2
3614	C6
3616	A5
3618	A4
3620	B4
3622	B4
3623	B3
3624	C6
3625	B3
3626	C6
3628	A5
3630	B6
3672	C4
3674	B5
3676	C5
3678	C5
3679	C3
3680	C5
3685	D2
3686	E6
3687	E2
3688	B5
3689	F3
4785	E2
6611	B2
6612	A6
6614	C4
7610	D4
7612	A6
7613	B3
7614	B6
7616	B4
7618	C5
7619	C4
7620	C6
7622	C5
7623	D2
7624	E6



ETF5 TAPE MODULE EXPLODED VIEW

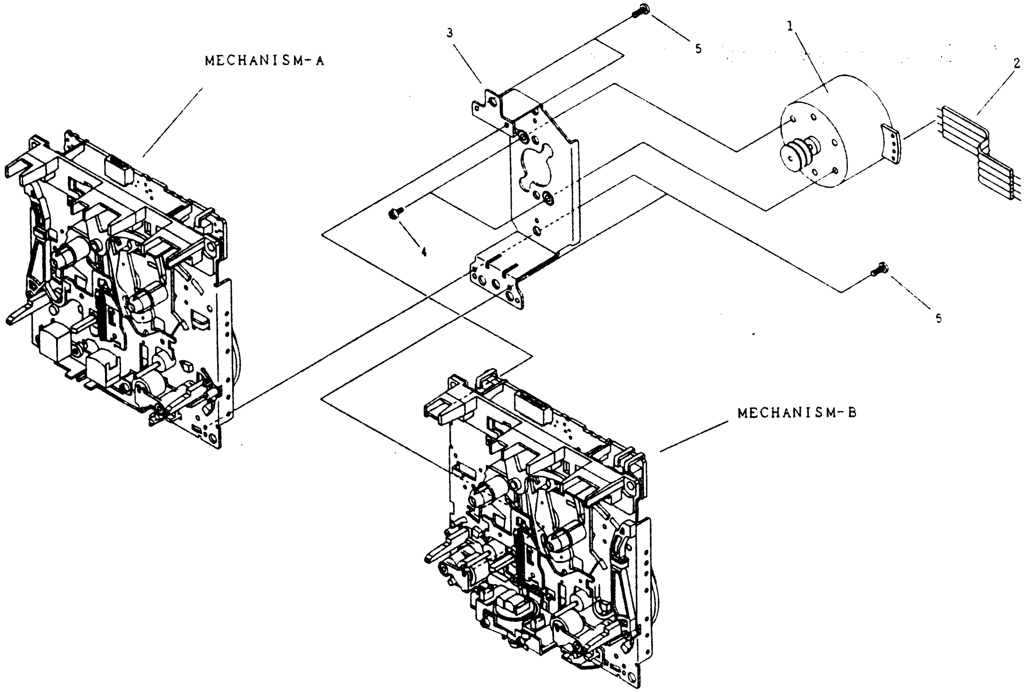
1	4822 691 10671	Tape Mechanism CWB44FR502
3	-	Screw M2 x 16
6	4822 320 12243	Flex Cable 6 pin 18 cm
7	4822 320 12242	Flex Cable 10 pin 7,5 cm
9	-	Screw D3 x 10

Note: Only the parts mentioned in this list are normal service spare parts.

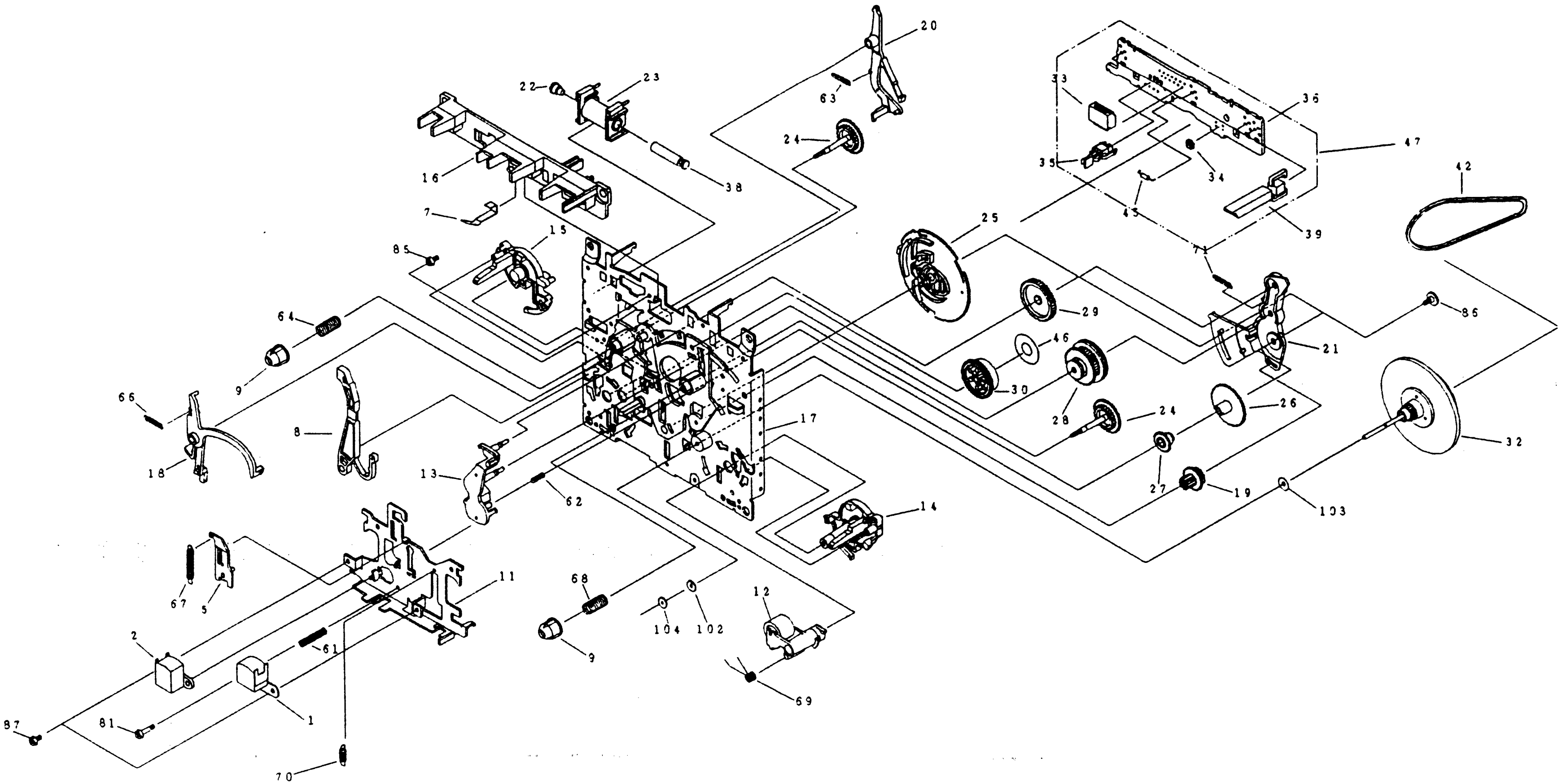
TAPE MECHANISM A & B EXPLODED VIEW

1	4822 361 10841	Motor Assembly
4	-	Screw M2,6 x 4
5	-	Screw M2 x 3

Note: Only the parts mentioned in this list are normal service spare parts.



TAPE MECHANISM A - PLAY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70

MECHANICAL PARTS - PLAY MECHANISM

1	4822 249 10397	MS15RAA2N1
2	4822 249 30146	Dummy Head
12	4822 528 10974	Assembly Arm Pinch R
23	4822 281 11069	Solenoid
32	4822 528 11209	Assembly Flywheel RV
33	4822 265 11207	Connector Socket 6 pin
34	4822 130 10205	Photo Sensor
35	4822 276 13946	Mode Switch
39	4822 278 90613	Leaf Switch
42	4822 358 10168	Belt AF 40mm
45	4822 050 16801	680R 1% 0,4w
69	4822 492 11542	Spring
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer

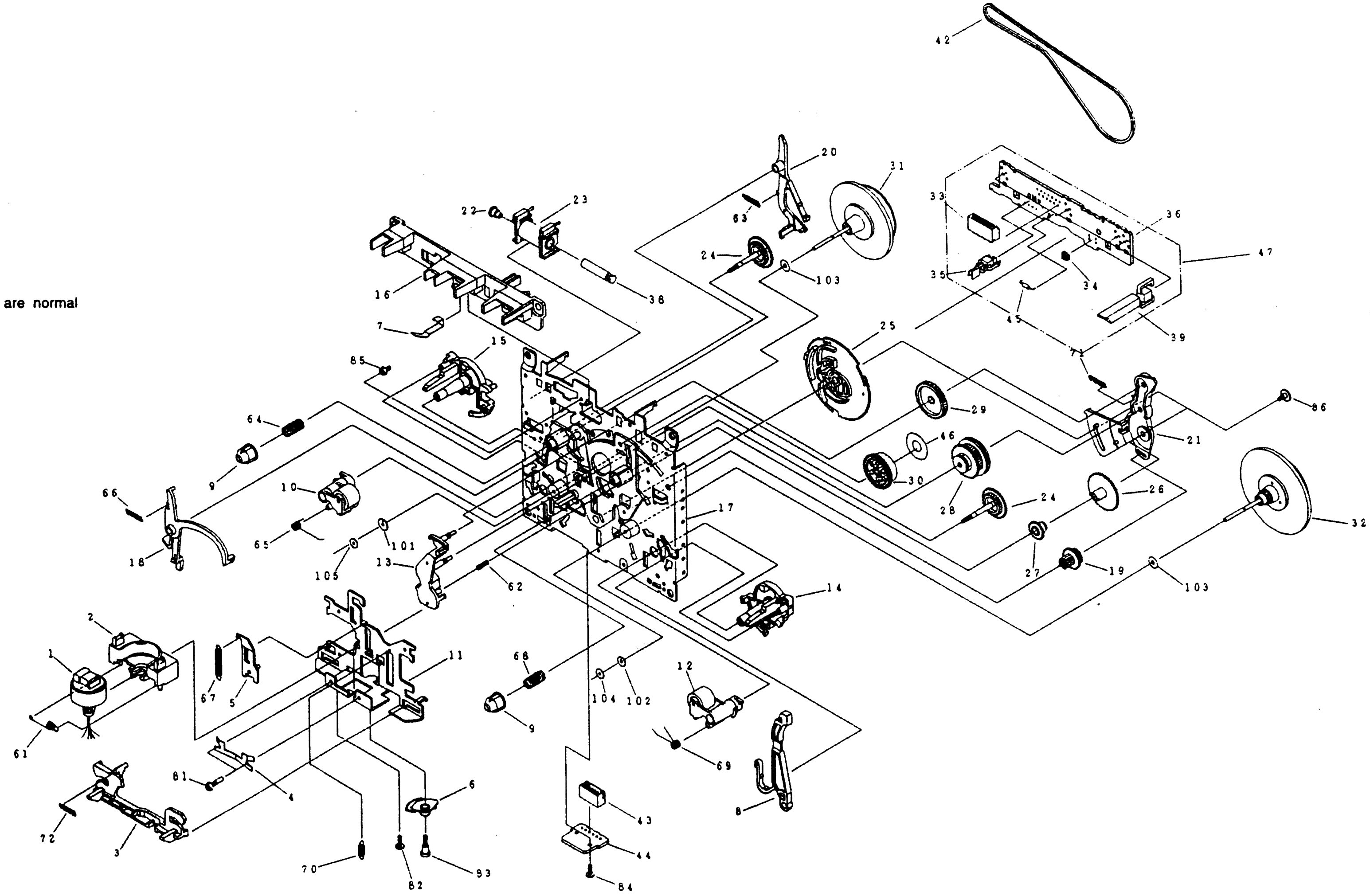
Note: Only the parts mentioned in this list are normal service spare parts.

TAPE MECHANISM B - RECORD/PLAYBACK

MECHANICAL PARTS - PLAY MECHANISM

1	4822 249 10521	Record/Playback Head
10	4822 528 10975	Assembly Arm Pinch L
12	4822 528 10974	Assembly Arm Pinch R
23	4822 281 11069	Solenoid
31	4822 528 11211	Assembly Flywheel LV
32	4822 528 11209	Assembly Flywheel RV
33	4822 265 11208	Connector Socket 10 pin
34	4822 130 10205	Photo Sensor
35	4822 276 13946	Mode Switch
39	4822 278 90613	Leaf Switch
42	4822 358 10169	Belt
45	4822 050 16801	680R 1% 0,4w
65	4822 492 11546	Spring
69	4822 492 11542	Spring
101	4822 532 12934	Washer
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer
105	4822 532 12935	Washer

Note: Only the parts mentioned in this list are normal service spare parts.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72
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83
44
84

ELECTRICAL PARTS LIST - ETF5.. NON-DOLBY BOARD

MISCELLANEOUS

1701	4822 267 10953	Flex Socket 7pin Vert.
1706	4822 267 10953	Flex Socket 7pin Vert.
1740	4822 267 10729	Flex Socket 10pin Vert.
1750	4822 267 10731	Flex Socket 6pin Vert.

CAPACITORS

2621	5322 122 34123	1nF 10% 50V
2622	5322 122 34099	470pF 10% 63V
2623	5322 122 34099	470pF 10% 63V
2624	4822 126 13196	100nF 10% 25V.
2625	4822 126 13196	100nF 10% 25V
2701	5322 122 33538	150pF 2% 63V
2702	5322 122 33538	150pF 2% 63V
2703	5322 122 32531	100pF 5% 50V
2704	5322 122 32531	100pF 5% 50V
2705	4822 122 33575	220pF 5% 63V
2706	4822 122 33575	220pF 5% 63V
2707	5322 122 34099	470pF 10% 63V
2708	5322 122 34099	470pF 10% 63V
2709	5322 122 31863	330pF 5% 63V
2710	5322 122 31863	330pF 5% 63V
2711	5322 122 32531	100pF 5% 50V
2712	5322 122 32531	100pF 5% 50V
2713	4822 124 41579	10µF 20% 50V
2714	4822 124 41579	10µF 20% 50V
2715	4822 124 40196	220µF 20% 16V
2716	4822 124 40196	220µF 20% 16V
2717	4822 122 33177	10nF 20% 50V
2718	4822 122 33177	10nF 20% 50V
2719	4822 126 12105	33nF 5% 50V
2720	4822 126 12105	33nF 5% 50V
2721	5322 122 31866	6,8nF 10% 63V
2722	5322 122 31866	6,8nF 10% 63V
2723	4822 126 13188	15nF 5% 63V
2724	4822 126 13188	15nF 5% 63V
2725	5322 126 10223	4,7nF 10% 63V
2726	5322 126 10223	4,7nF 10% 63V
2727	5322 122 34123	1nF 10% 50V
2728	5322 122 34123	1nF 10% 50V
2729	4822 122 33735	27nF 10% 63V
2730	4822 122 33735	27nF 10% 63V
2733	5322 122 34099	470pF 10% 63V
2734	5322 122 34099	470pF 10% 63V
2735	4822 126 13196	100nF 10% 25V
2737	4822 126 13196	100nF 10% 25V
2738	4822 126 13196	100nF 10% 25V
2741	4822 126 11585	22nF +80/-20% 25V
2742	5322 122 32654	22nF 10% 63V
2743	5322 122 32654	22nF 10% 63V
2744	4822 126 13196	100nF 10% 25V
2760	4822 126 13196	100nF 10% 25V
2761	4822 124 22263	220µF 20% 25V
2762	4822 124 40769	4,7µF 20% 100V
2763	4822 124 40433	47µF 20% 25V
2765	4822 124 40433	47µF 20% 25V
2769	5322 122 34099	470pF 10% 63V
2770	5322 122 34099	470pF 10% 63V
2780	4822 124 81151	22µF 50V
2781	4822 122 33177	10nF 20% 50V
2782	5322 126 10223	4,7nF 10% 63V
2784	4822 121 51305	15nF 10% 50V
2785	4822 124 40242	1µF 20% 63V
2786	5322 122 32531	100pF 5% 50V
2787	4822 126 12105	33nF 5% 50V

RESISTORS

3601	4822 117 11449	2k2 1% 0,1W
3602	4822 051 20273	27k 5% 0,1W
3603	4822 117 11449	2k2 1% 0,1W
3604	4822 117 11148	56k 1% 0,1W
3605	4822 117 11449	2k2 1% 0,1W
3606	4822 051 20124	120k 5% 0,1W
3607	4822 116 52256	2k2 5% 0,5W
3608	4822 051 20273	27k 5% 0,1W
3609	4822 116 52256	2k2 5% 0,5W
3610	4822 051 20124	120k 5% 0,1W
3611	4822 116 52256	2k2 5% 0,5W
3612	4822 117 11148	56k 1% 0,1W
3613	4822 051 20273	27k 5% 0,1W
3614	4822 051 20273	27k 5% 0,1W
3616	4822 117 10833	10k 1% 0,1W
3618	4822 117 10833	10k 1% 0,1W
3620	5322 100 11542	Trimmer 4k7 30% 0,1W
3623	4822 051 20104	100k 5% 0,1W
3624	4822 051 20104	100k 5% 0,1W
3625	4822 051 10102	1k 2% 0,25W
3626	4822 051 10102	1k 2% 0,25W
3628	4822 051 20104	100k 5% 0,1W
3630	4822 051 20471	470R 5% 0,1W
3672	4822 051 20472	4k7 5% 0,1W
3674	4822 116 52283	4k7 5% 0,5W
3676	4822 117 10834	47k 1% 0,1W
3678	4822 117 10834	47k 1% 0,1W
3679	4822 117 10834	47k 1% 0,1W
3680	4822 117 10834	47k 1% 0,1W
3685	4822 116 52234	100k 5% 0,5W
3686	4822 051 20104	100k 5% 0,1W
3688	4822 051 20681	680R 5% 0,1W
3701	4822 117 11503	220R 1% 0.1W
3702	4822 117 11503	220R 1% 0.1W
3703	4822 117 11503	220R 1% 0.1W
3704	4822 117 11503	220R 1% 0.1W
3705	4822 117 11503	220R 1% 0.1W
3706	4822 117 11503	220R 1% 0.1W

ELECTRICAL PARTS LIST - ETF5.. NON-DOLBY BOARD

3707	4822 051 20101	100R 5% 0,1W
3708	4822 051 20101	100R 5% 0,1W
3709	4822 051 20688	6R8 5% 0,1W
3710	4822 051 20688	6R8 5% 0,1W
3711	4822 051 20154	150k 5% 0,1W
3712	4822 051 20154	150k 5% 0,1W
3713	4822 051 20109	10R 5% 0,1W
3714	4822 051 20109	10R 5% 0,1W
3715	4822 051 20182	1k8 5% 0,1W
3716	4822 051 20182	1k8 5% 0,1W
3717	4822 117 11449	2k2 1% 0,1W
3718	4822 117 11449	2k2 1% 0,1W
3719	4822 051 20472	4k7 5% 0,1W
3720	4822 051 20472	4k7 5% 0,1W
3721	4822 051 20562	5k6 5% 0,1W
3722	4822 051 20562	5k6 5% 0,1W
3723	4822 117 11383	12k 1% 0,1W
3724	4822 117 11383	12k 1% 0,1W
3725	4822 051 20109	10R 5% 0,1W
3726	4822 051 20109	10R 5% 0,1W
3727	4822 051 20562	5k6 5% 0,1W
3728	4822 051 20562	5k6 5% 0,1W
3729	4822 117 12955	2k7 1% 0,1W
3730	4822 117 12955	2k7 1% 0,1W
3731	4822 117 11507	6k8 1% 0,1W
3732	4822 117 11507	6k8 1% 0,1W
3733	4822 051 10102	1k 2% 0,25W
3734	4822 051 10102	1k 2% 0,25W
3735	4822 051 20223	22k 5% 0,1W
3736	4822 051 20223	22k 5% 0,1W
3741	4822 117 11449	2k2 1% 0,1W
3742	4822 117 11449	2k2 1% 0,1W
3743	4822 051 20122	1k2 5% 0,1W
3744	4822 051 20122	1k2 5% 0,1W
3745	4822 051 20332	3k3 5% 0,1W
3746	4822 051 20332	3k3 5% 0,1W
3748	4822 117 11449	2k2 1% 0,1W
3749	4822 117 10834	47k 1% 0,1W
3751	4822 117 10833	10k 1% 0,1W
3752	4822 051 20104	100k 5% 0,1W
3753	4822 051 20104	100k 5% 0,1W
3754	4822 051 20105	1M 5% 0,1W
3755	4822 051 20105	1M 5% 0,1W
3756	4822 117 13579	220k 1% 0,1W
3757	4822 117 13579	220k 1% 0,1W
3758	4822 117 10833	10k 1% 0,1W
3759	4822 117 10833	10k 1% 0,1W
3760	4822 051 20121	120R 5% 0,1W
3761	4822 116 83864	10k 5% 0,5W
3762	4822 117 11454	820R 1% 0,1W
3763	4822 051 20154	150k 5% 0,1W
3764	4822 116 83872	220R 5% 0,5W
3765	4822 051 20393	39k 5% 0,1W
3766	4822 051 20475	4M7 5% 0,1W
3767	4822 051 20475	4M7 5% 0,1W
3768	4822 117 10833	10k 1% 0,1W
3769	4822 117 11507	6k8 1% 0,1W
3770	4822 117 11139	1k5 1% 0,1W
3771	4822 051 20122	1k2 5% 0,1W
3772	4822 051 20822	8k2 5% 0,1W
3773	5322 100 11542	Trimmer 4k7 30% 0,1W
3774	4822 051 20822	8k2 5% 0,1W
3775	4822 051 20478	4R7 5% 0,1W
3776	4822 117 11507	6k8 1% 0,1W
3777	4822 117 10353	150R 1% 0,1W
3778	4822 052 10688 △	6R8 5% 0.33W
3779	4822 051 20334	330k 5% 0,1W
3780	4822 051 20105	1M 5% 0.1W
3781	4822 051 20475	4M7 5% 0.1W
3784	4822 051 10102	1k 2% 0,25W
3786	4822 051 20223	22k 5% 0,1W
3787	4822 051 20105	1M 5% 0,1W
3788	4822 051 20105	1M 5% 0,1W
3789	4822 117 10834	47k 1% 0,1W
4701	4822 051 20008	0R Jumper 0805
4702	4822 051 20008	0R Jumper 0805
4703	4822 051 20008	0R Jumper 0805
4704	4822 051 20008	0R Jumper 0805
4705	4822 051 20008	0R Jumper 0805
4706	4822 051 20008	0R Jumper 0805
4707	4822 051 20008	0R Jumper 0805
4708	4822 051 20008	0R Jumper 0805
4709	4822 051 20008	0R Jumper 0805
4710	4822 051 20008	0R Jumper 0805
4711	4822 051 20008	0R Jumper 0805
4712	4822 051 20008	0R Jumper 0805
4713	4822 051 20008	0R Jumper 0805
4714	4822 051 20008	0R Jumper 0805
4715	4822 051 20008	0R Jumper 0805
4716	4822 051 20008	0R Jumper 0805
4717	4822 051 20008	0R Jumper 0805
4718	4822 051 20008	0R Jumper 0805
4719	4822 051 20008	0R Jumper 0805
4720	4822 051 20008	0R Jumper 0805
4721	4822 051 20008	0R Jumper 0805
4722	4822 051 20008	0R Jumper 0805
4723	4822 051 20008	0R Jumper 0805
4724	4822 051 20008	0R Jumper 0805
4725	4822 051 20008	0R Jumper 0805
4726	4822 051 20008	0R Jumper 0805
4727	4822 051 20008	0R Jumper 0805
4728	4822 051 20008	0R Jumper 0805
4729	4822 051 20008	0R Jumper 0805
4730	4822 051 20008	0R Jumper 0805

ELECTRICAL PARTS LIST - ETF5.. NON-DOLBY BOARD

RESISTORS

4731	4822 051 20008	0R Jumper 0805
4732	4822 051 20008	0R Jumper 0805
4733	4822 051 20008	0R Jumper 0805
4734	4822 051 20008	0R Jumper 0805
4735	4822 051 20008	0R Jumper 0805
4736	4822 051 20008	0R Jumper 0805
4737	4822 051 20008	0R Jumper 0805
4738	4822 051 20008	0R Jumper 0805
4739	4822 051 20008	0R Jumper 0805
4740	4822 051 20008	0R Jumper 0805
4743	4822 051 20008	0R Jumper 0805
4785	4822 051 20008	0R Jumper 0805
4790	4822 051 20008	0R Jumper 0805
4794	4822 051 20008	0R Jumper 0805

COILS & FILTERS

5701	4822 157 11477	Coil 2,2µH 5%
5703	4822 156 20946	Osc. Coil 100kHz

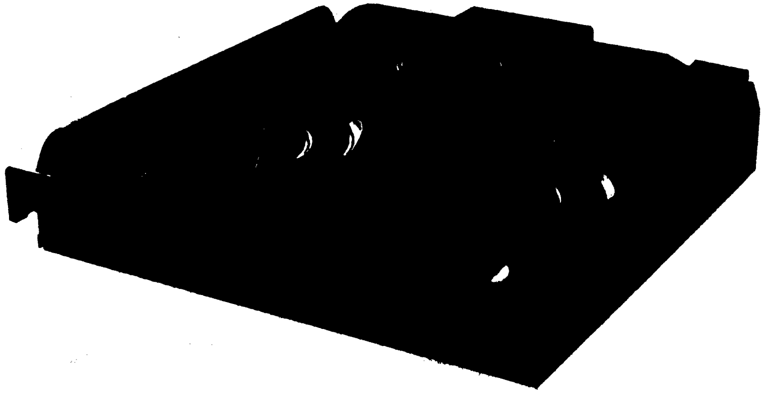
DIODES

6611	4822 130 31878	1N4003G
6612	4822 130 31878	1N4003G
6614	4822 130 30621	1N4148
6770	4822 130 30621	1N4148
6771	4822 130 30621	1N4148
6772	4822 130 30621	1N4148
6773	4822 130 30621	1N4148
6774	4822 130 30621	1N4148
6775	4822 130 30621	1N4148
6776	4822 130 30621	1N4148
6777	4822 130 34382	BZX79-B8V2
6778	4822 130 30621	1N4148
6782	4822 130 30621	1N4148
6785	4822 130 30621	1N4148
6786	4822 130 30621	1N4148

TRANSISTORS & INTEGRATED CIRCUITS

7610	5322 209 11306	HEF4094BT
7612	5322 130 60845	BC807-25
7613	5322 130 60845	BC807-25
7614	5322 130 60845	BC807-25
7616	5322 130 60508	BC857B
7618	4822 130 60511	BC847B
7619	4822 130 60511	BC847B
7620	4822 130 60511	BC847B
7622	4822 130 60511	BC847B
7623	4822 130 60511	BC847B
7624	4822 130 60511	BC847B
7710	4822 209 32919	HEF4952BT
7720	4822 209 32918	AN7318S
7730	4822 209 32919	HEF4952BT
7740	4822 209 32919	HEF4952BT
7780	4822 130 60511	BC847B
7781	4822 130 60511	BC847B
7782	4822 130 44568	BC557B
7783	4822 130 60511	BC847B
7784	5322 130 60508	BC857B
7786	4822 130 63494	J111
7787	4822 130 60511	BC847B
7791	4822 130 60511	BC847B
7792	4822 130 60511	BC847B

Note: Only the parts mentioned in this list are normal service spare parts.



3CDC 99 Module

(3 Disc Carrousel Changer)

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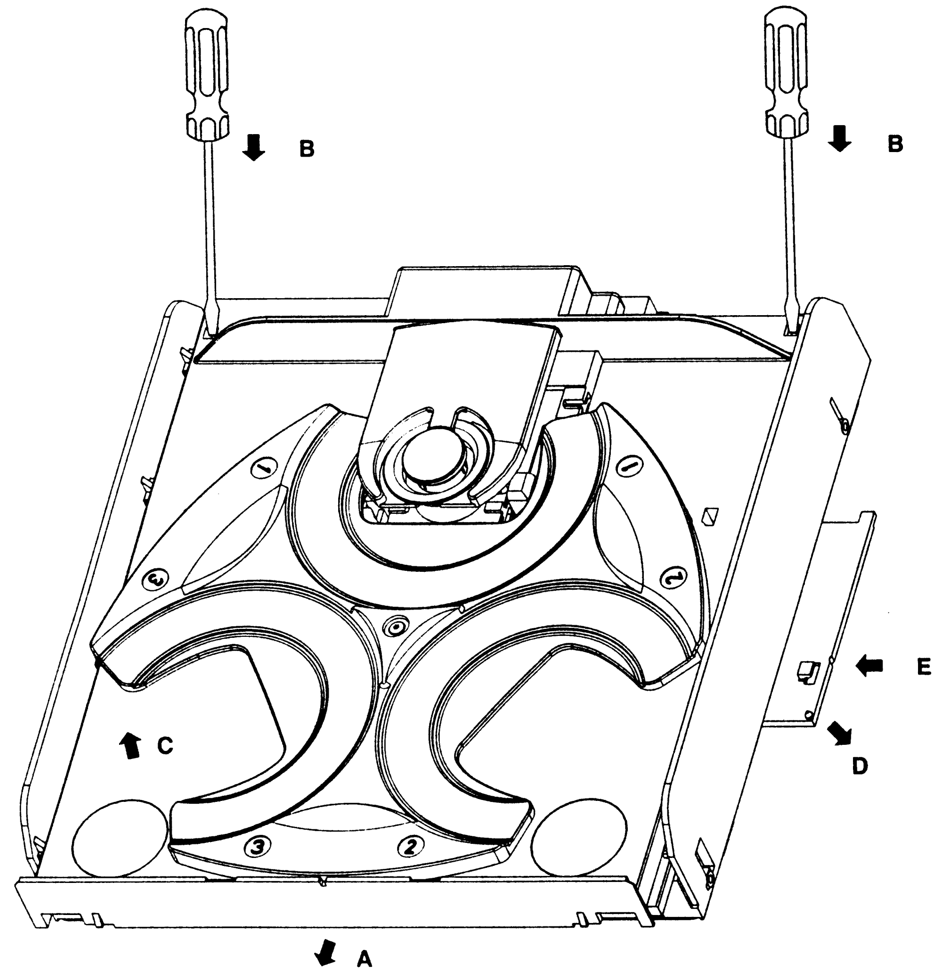
Demounting Hints



Demounting of Drawer

- → **A** Pull drawer outwards
- → **B** Unlock drawer with screwdriver
- → **C** Lift drawer to demount from chassis

Demounting of Flex Plate

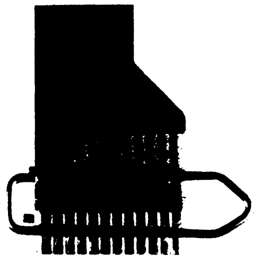
- → **D** Lift plate to unlock pin from bottom plate
- → **E** Move plate inwards to demount from bottom plate

Servicing Hints

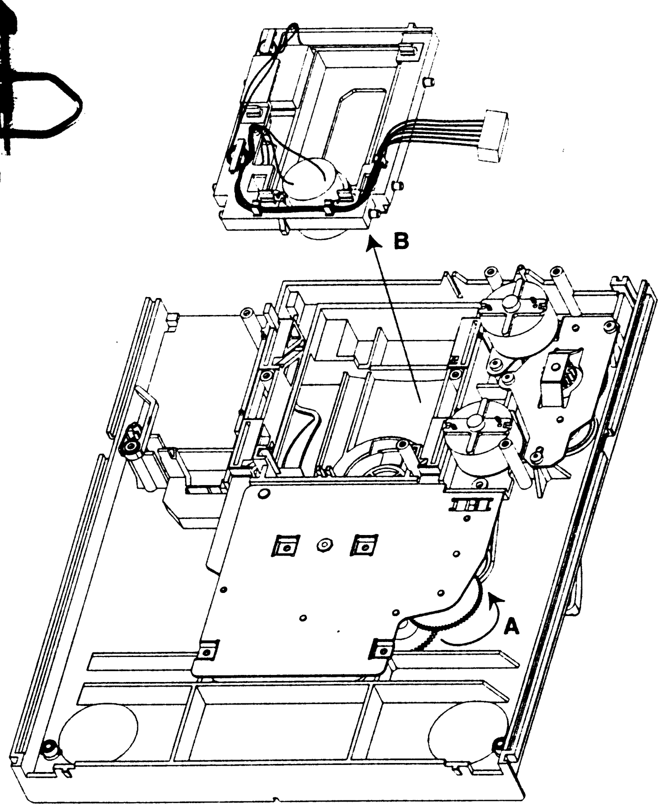
Replacement of CD Drive

See also exploded view of changer mechanism.

1. Demount printed circuit board: remove 5 screws.
2. Disconnect flexfoil and JST connector of CD drive from Printed circuit board. Shortcircuit the flexfoil with a paperclip to protect the laser against ESD.
3. Remove 2 screws (pos 107,108) and demount CD drive lockings (pos 105,106).
4. Turn gearwheel (pos 42) of disc change mechanism by finger to move CD drive support in upper position as shown in picture below Ⓐ.
5. Demount CD drive support (pos 95) Ⓑ.
6. Replace CD drive (pos 100). The wire tree of JST connector has to be desoldered and resoldered on the new CD drive again.



CD drive flex foil

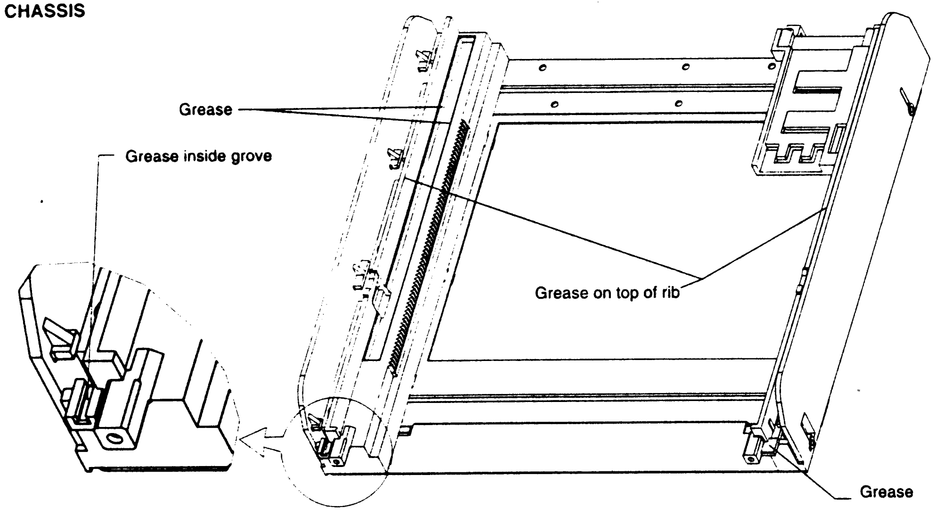


Mounting of Carrousel

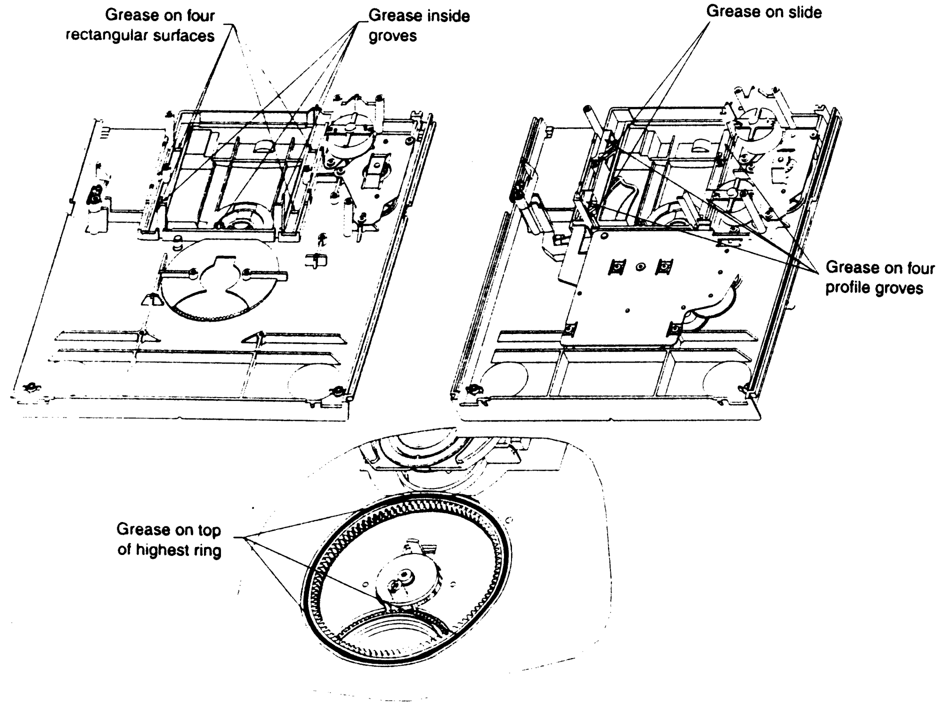
1. Turn gearwheel (pos 42) of disc change mechanism by finger until CD drive is in play position.
2. Mount carrousel (pos 115) so that disc is positioned right on turntable. Carrousel position number doesn't matter.

Lubrication Instructions

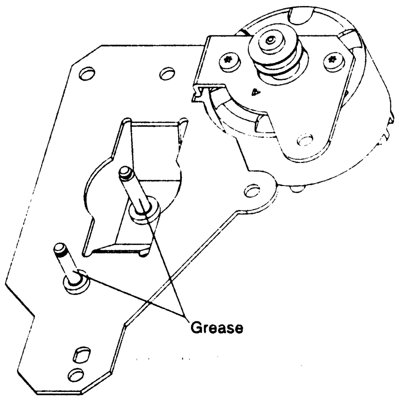
CHASSIS


Grease
Grease inside grove
Grease on top of rib
Grease

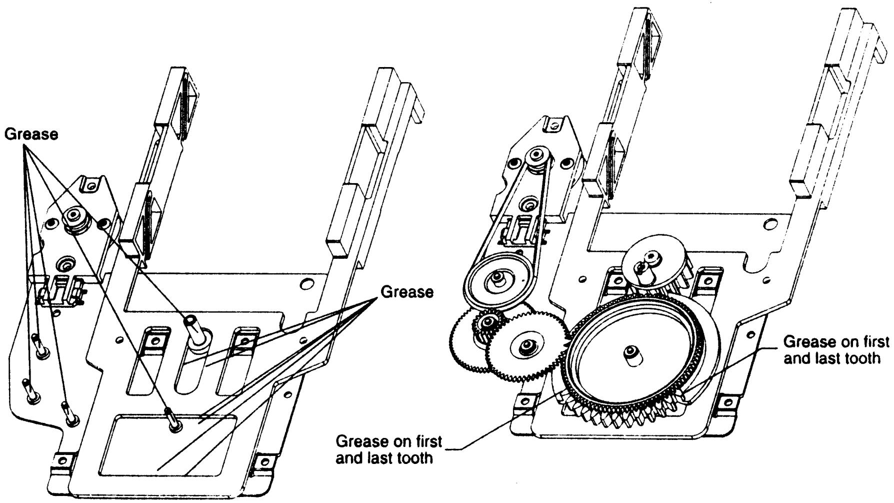
DRAWER


Grease on four rectangular surfaces
Grease inside groves
Grease on slide
Grease on four profile groves
Grease on top of highest ring

DRAWER MECHANISM



DISC CHANGE MECHANISM


Grease
Grease
Grease on first and last tooth
Grease on first and last tooth

Use only grease **Polylub GLY 801** service codenumber 4822 390 10136

WARNING

CHARGED CAPACITORS ON THE SERVO BOARD MAY DAMAGE THE CD DRIVE ELECTRONICS WHEN CONNECTING A NEW CDM MECHANISM. THAT'S WHY, BESIDES THE SAFETY MEASURES LIKE
- *SWITCH OFF POWER SUPPLY*
- *ESD PROTECTION*

ADDITIONAL ACTIONS MUST BE TAKEN BY THE REPAIR TECHNICIAN.

The following steps have to be done when replacing the CDM mechanism:

1. Disconnect old CD drive flexfoil from printed board
2. Connect paperclip to CD drive flexfoil to short-circuit flexfoil (fig.1)
3. Short-circuit printed board with **brass-sheet (4822 321 11197)** plugged into the flexfoil connector (fig.2)
4. Remove old CD drive mechanism
5. Position new CD mechanism in its studs
6. Remove short-circuit from printed board connector
7. Remove short-circuit from flexfoil of new CD drive
8. Connect new flexfoil to print connector (fig.3)

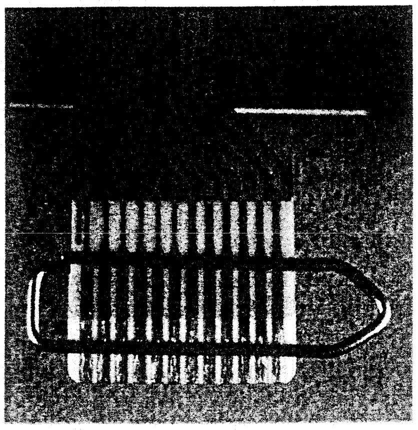


fig.1

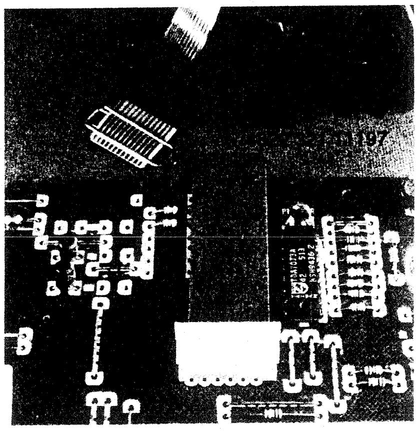


fig.2

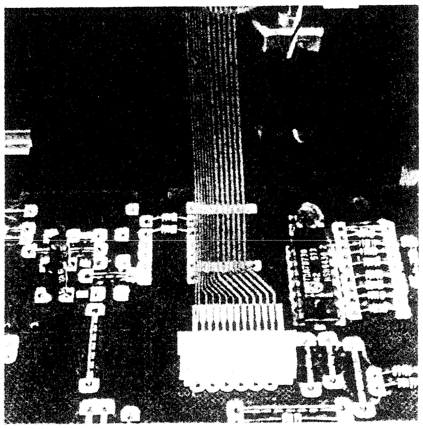
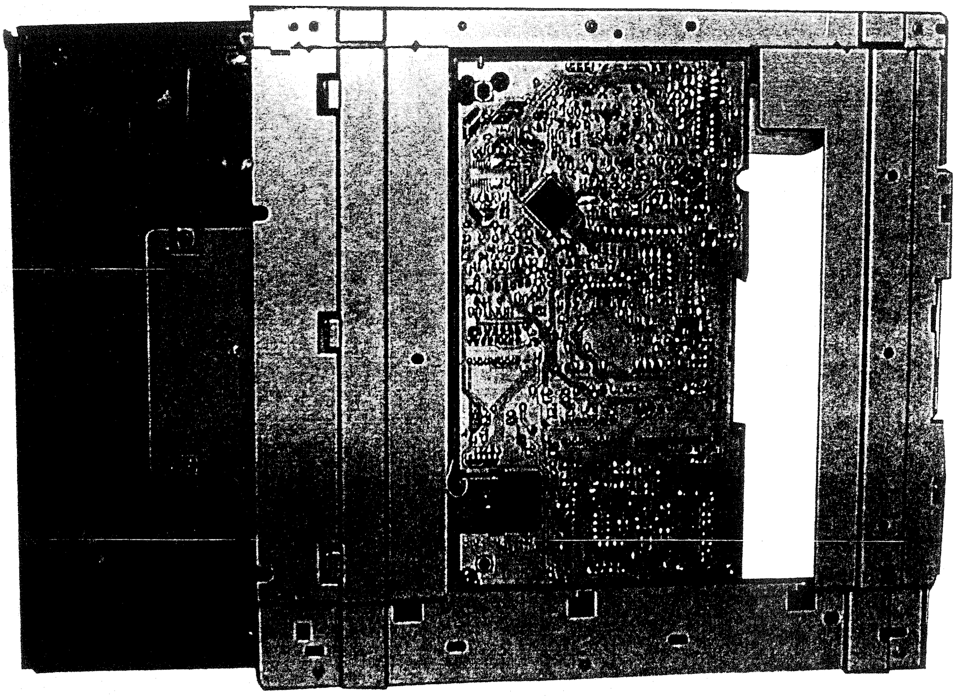
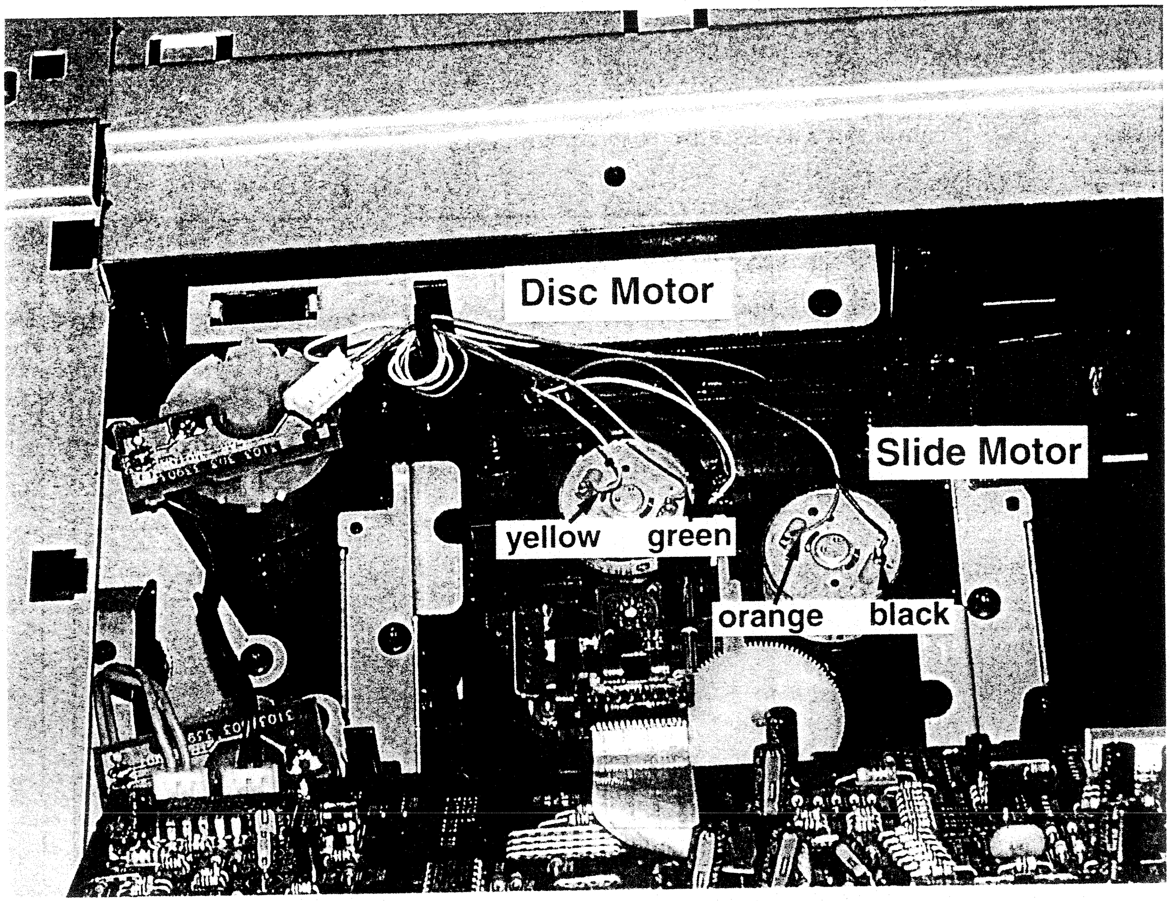


fig.3

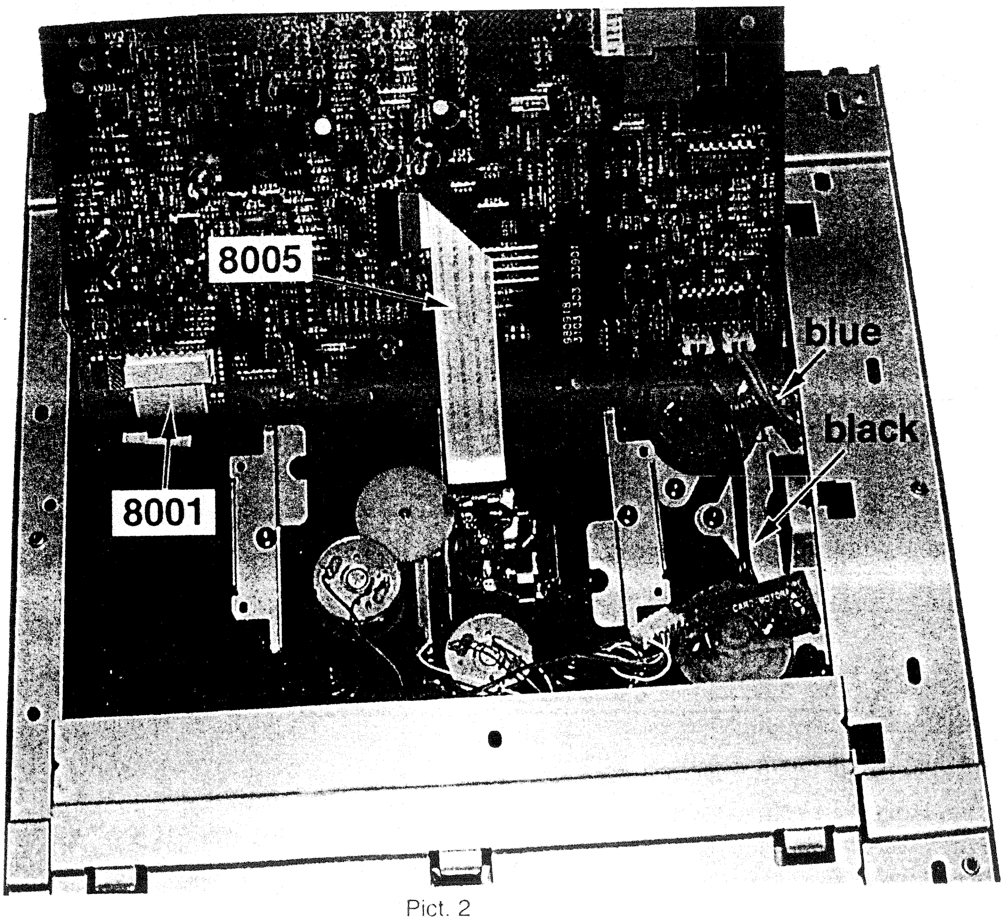
Service Position



Wiring of CD Drive

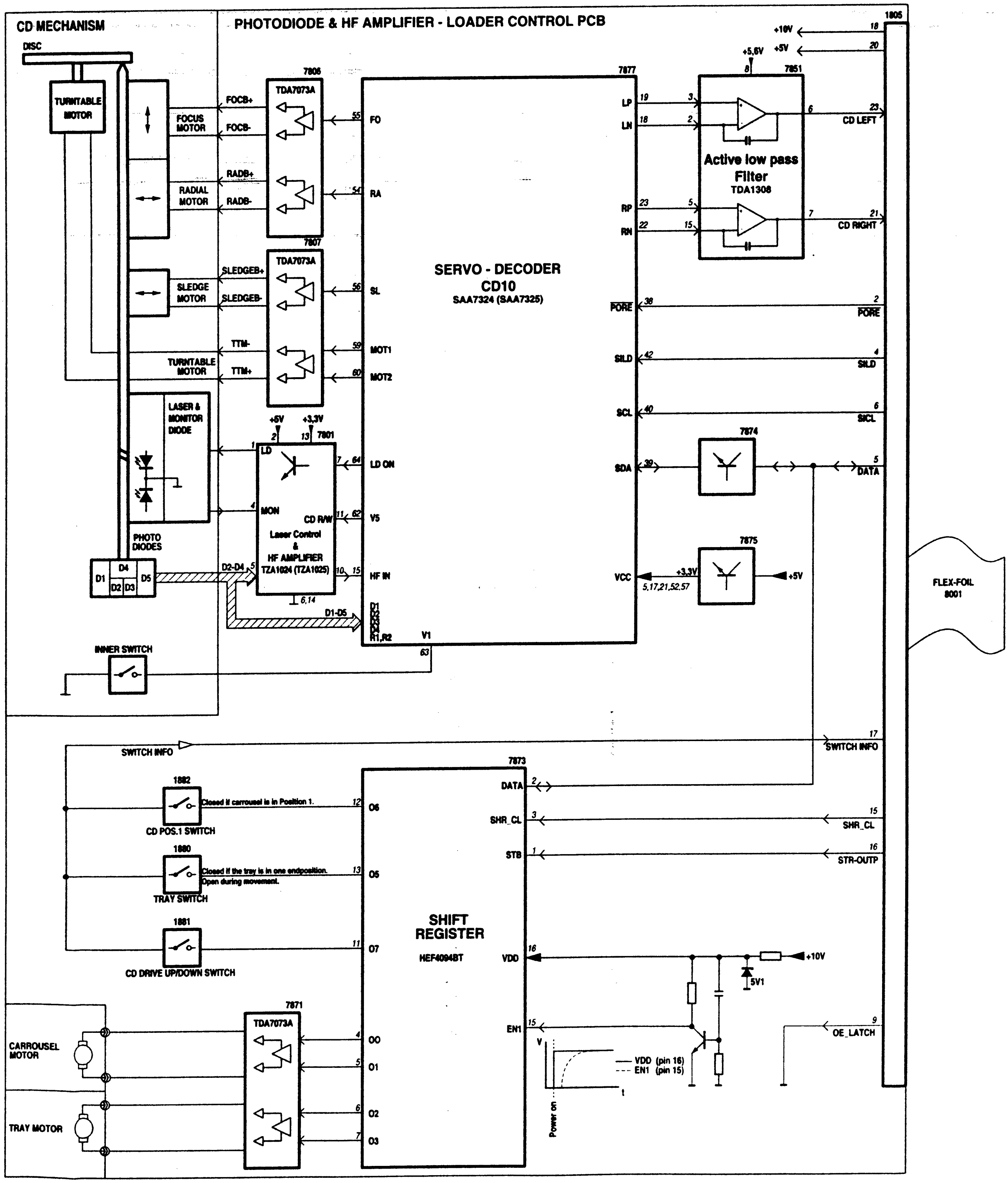

Disc Motor
Slide Motor
yellow
green
orange
black

Pict. 1


8005
blue
black
8001

Pict. 2

Blockdiagram


CD MECHANISM
PHOTODIODE & HF AMPLIFIER - LOADER CONTROL PCB
DISC
TURNTABLE MOTOR
FOCUS MOTOR
RADIAL MOTOR
SLEDGE MOTOR
TURNTABLE MOTOR
LASER & MONITOR DIODE
PHOTO DIODES
D1 D2 D3 D4 D5
INNER SWITCH
FOCB+
FOCB-
RADB+
RADB-
SLEDGEB+
SLEDGEB-
TTM-
TTM+
7806 TDA7073A
7807 TDA7073A
7801
+5V
+3,3V
LD
MON
CD R/W
Laser Control & HF AMPLIFIER TZA1024 (TZA1025)
D2-D4
D1-D5
6,14
7877
SERVO - DECODER CD10 SAA7324 (SAA7325)
FO
RA
SL
MOT1
MOT2
LD ON
V5
HF IN
D1 D2 D3 D4 R1,R2
V1
LP
LN
RP
RN
PORE
SILD
SCL
SDA
VCC
+3,3V
5,17,21,52,57
7851
Active low pass Filter TDA1308
+5,6V
+10V
+5V
CD LEFT
CD RIGHT
PORE
SILD
SICL
DATA
7874
7875
+5V
1805
FLEX-FOIL 8001
SWITCH INFO
1882
Closed if carrousel is in Position 1.
CD POS.1 SWITCH
1880
Closed if the tray is in one endposition. Open during movement.
TRAY SWITCH
1881
CD DRIVE UP/DOWN SWITCH
7873
SHIFT REGISTER HEF4094BT
O6
O5
O7
O0
O1
O2
O3
DATA
SHR_CL
STB
VDD
EN1
SHR_CL
STR-OUTP
OE_LATCH
+10V
5V1
V
t
Power on
VDD (pin 16)
EN1 (pin 15)
7871 TDA7073A
CARROUSEL MOTOR
TRAY MOTOR

Blockdiagram 3CDC96 19981202

1800 D2
1801 G1
1810 C10
2800 C4
2801 C5
2802 C4
2803 C5

2805 B5
2806 B5
2807 A4
2808 A5
2809 H4
2810 A4
2811 A5

2814 D5
2815 D5
2816 B12
2818 B11
2822 F9
2823 F10
2824 F10

2825 F9
2826 G12
2828 G13
2833 C10
2834 C10
2835 F7
2837 H4

2838 E8
2839 F4
2840 G4
2841 F5
2842 F4
2844 G5
2849 C1

2850 D14
2851 B11
2855 B4
2856 D15
2857 G5
2859 H5
2869 D3

2879 H5
2880 D8
2884 E8
2885 F9
2887 B10
2888 E5
2891 F4

2892 D5
3709 C14
3727 B12
3728 E14
3800 C4
3801 C4
3802 C4

3803 C4
3805 B4
3806 B4
3807 A4
3808 A4
3811 B4
3812 H5

3815 E5
3819 D14
3820 D3
3821 D3
3822 D3
3823 D8
3824 D8

3825 F9
3826 F9
3827 E10
3828 G10
3831 B14
3832 D15
3833 A4

3834 A4
3835 F5
3837 F7
3838 F6
3839 G6
3840 H6
3841 G5

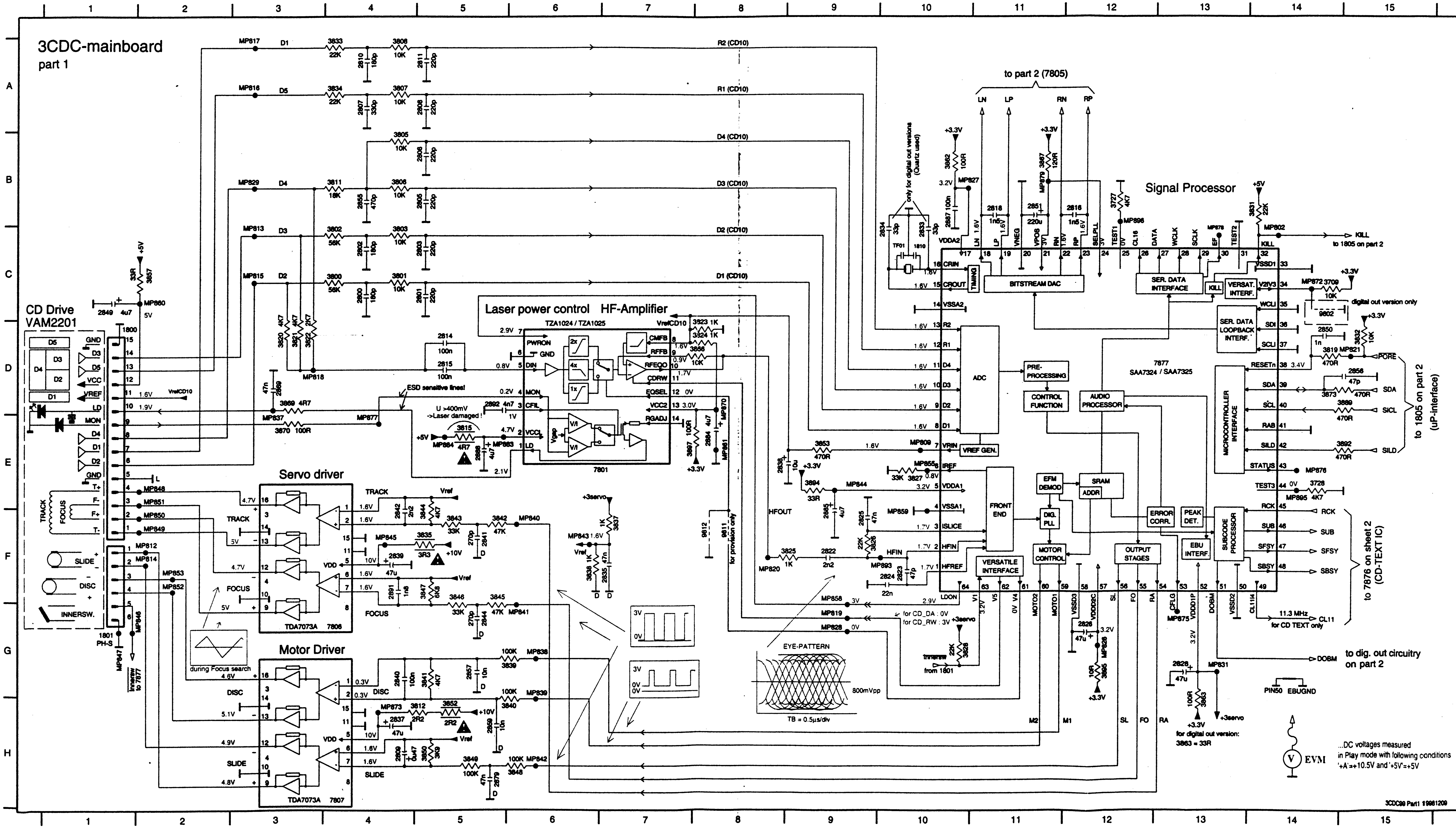
3842 F5
3843 F5
3844 F5
3845 F5
3846 F5
3847 F5
3848 H6

3849 H5
3850 H5
3852 H5
3853 E9
3857 C2
3862 B10
3863 H13

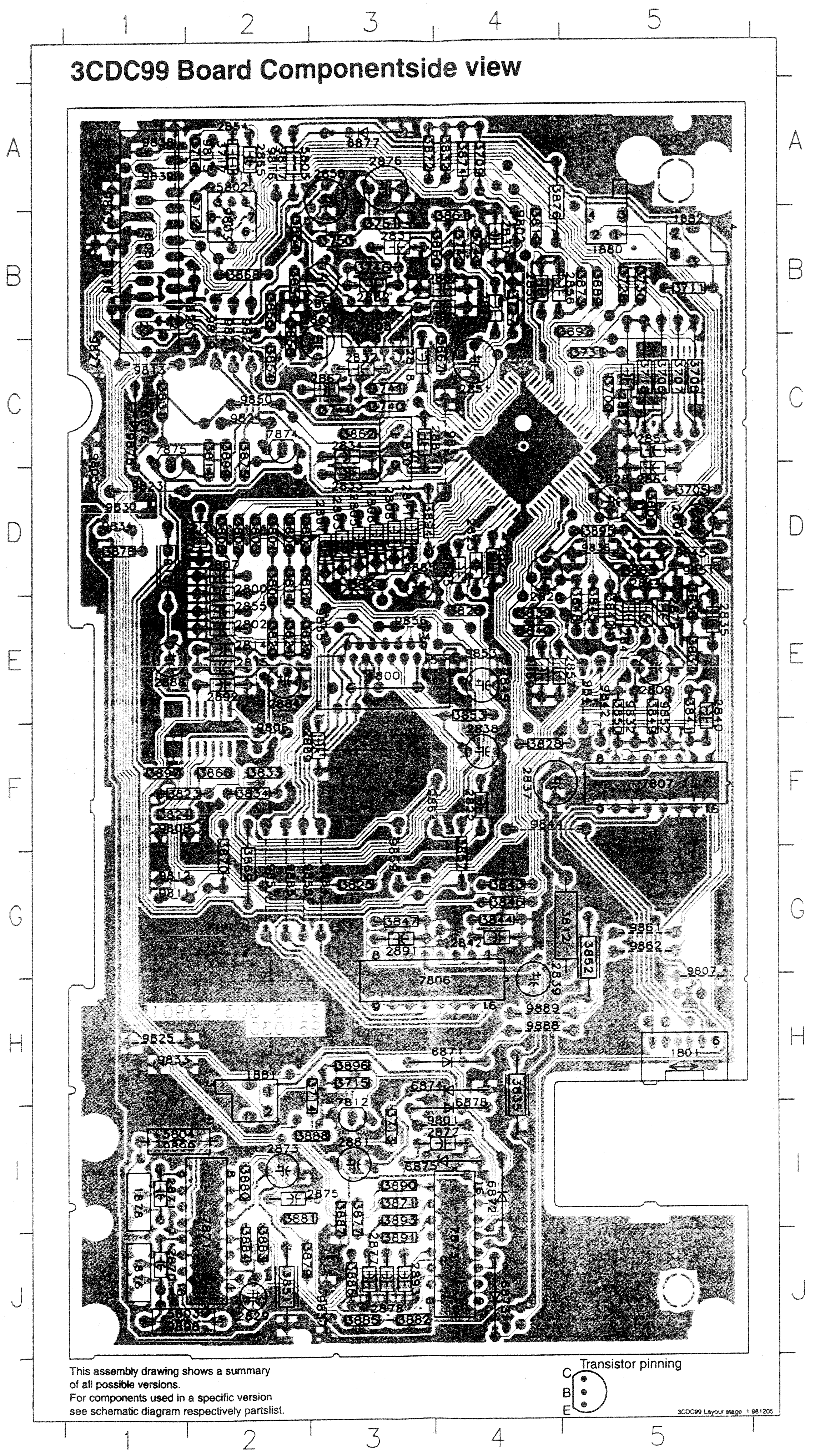
3866 D8
3867 B11
3869 D3
3870 E3
3873 D14
3889 D15
3892 E15

3894 E9
3895 G12
3897 E7
7801 E7
7806 G4
7807 H4
7877 D12

9802 C14
9811 F8
9812 F8


3CDC-mainboard
part 1
CD Drive
VAM2201
Laser power control
HF-Amplifier
TZA1024 / TZA1025
7801
Servo driver
TDA7073A 7806
Motor Driver
TDA7073A 7807
Signal Processor
7877
SAA7324 / SAA7325
to part 2 (7805)
LN LP RN RP
BITSTREAM DAC
ADC
PRE-PROCESSING
CONTROL FUNCTION
AUDIO PROCESSOR
FRONT END
EFM DEMOD
SRAM
ADDR
DIG. PLL
MOTOR CONTROL
VERSATILE INTERFACE
OUTPUT STAGES
ERROR CORR.
PEAK DET.
EBU INTERF.
SUBCODE PROCESSOR
MICROCONTROLLER INTERFACE
SER. DATA INTERFACE
SER. DATA LOOPBACK INTERF.
VERSAT. INTERF.
KILL
TIMING
VREF GEN.
to 1805 on part 2
(uP-interface)
to 7876 on sheet 2
(CD-TEXT IC)
to dig. out circuitry
on part 2
DOBM
KILL
to 1805 on part 2
digital out version only
only for digital out versions (Quartz used)
RCK
SUB
SFSY
SBSY
11.3 MHz
CL11
for CD TEXT only
SDA
SICL
SILD
PORE
ESD sensitive lines!
U >400mV
->Laser damaged !
for CD_DA : 0V
for CD_RW : 3V
Innersw from 1801
Innersw to 7877
for provision only
during Focus search
EYE-PATTERN
800mVpp
TB = 0.5µs/div
for digital out version:
3863 = 33R
PIN50 EBUGND
EVM
...DC voltages measured
in Play mode with following conditions
'+A'=+10.5V and '+5V'=+5V
TRACK
FOCUS
SLIDE
DISC
INNERSW.
MON
LD
VCC
VREF
GND
D1 D2 D3 D4 D5
T+ T- F+ F-
1800
1801
PH-S
3CDC99 Part1 19981209

3CDC99 Board Componentside view

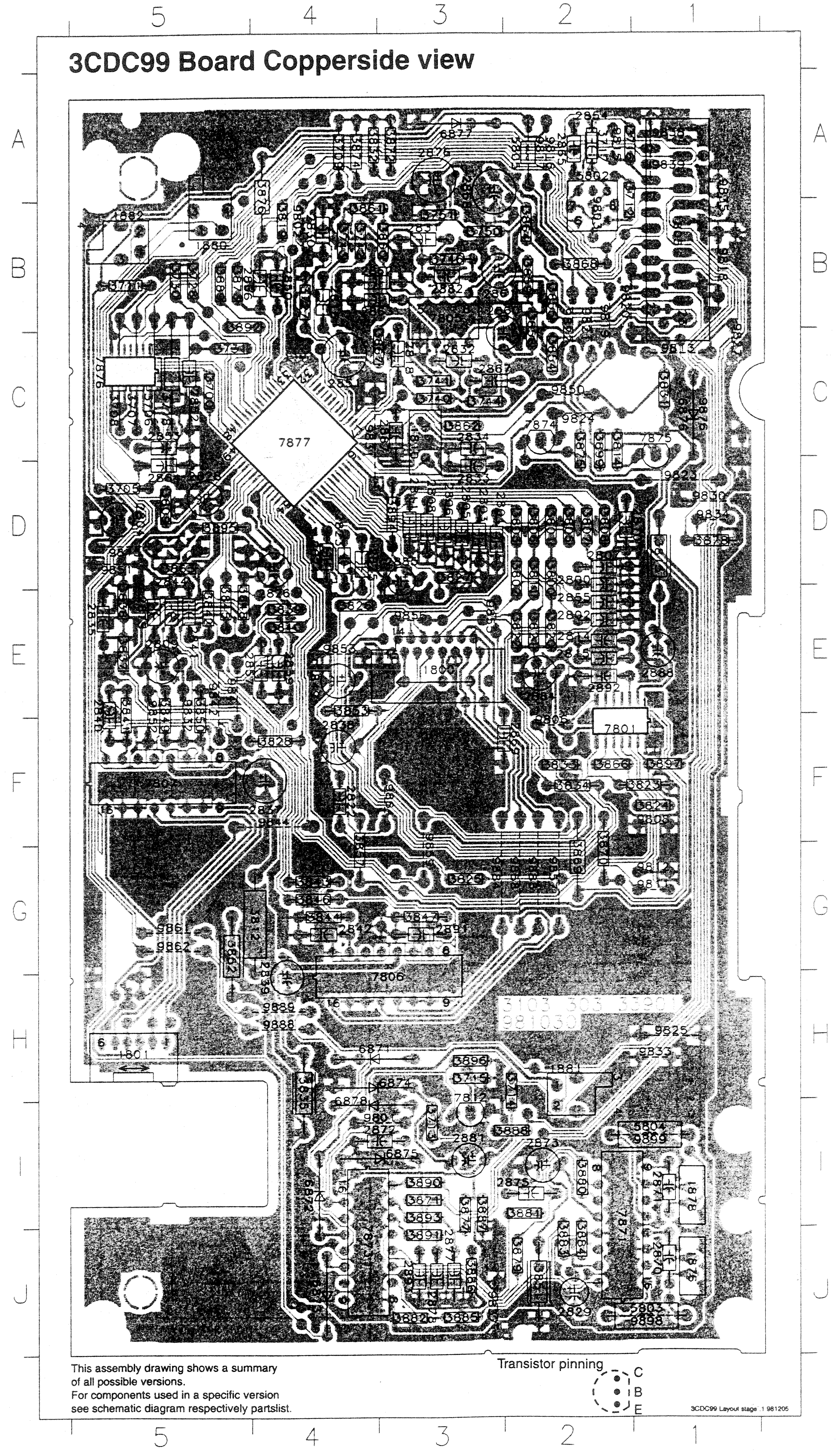


This assembly drawing shows a summary of all possible versions.
For components used in a specific version see schematic diagram respectively partslist.

Mapping

1800	E3
1801	H5
1805	B1
1810	C3
1876	J1
1878	I1
1880	B5
1881	H2
1882	B5
2800	D2
2801	D3
2802	E2
2803	D3
2804	D5
2805	D3
2806	D3
2807	D2
2808	D3
2809	E5
2810	D2
2811	D3
2814	E2
2815	E2
2816	B4
2818	C3
2822	F4
2823	D4
2824	D4
2825	D4
2826	E4
2828	D5
2829	J2
2830	B4
2831	B3
2832	C3
2833	D3
2834	C3
2835	E5
2837	F4
2838	F4
2839	H4
2840	E5
2841	E5
2842	G4
2844	D5
2849	E4
2850	B4
2851	C4
2852	C5
2853	C5
2854	A2
2855	E2
2856	B5
2857	E5
2858	A3
2859	E4
2860	B3
2861	B3
2862	B4
2863	B4
2864	D5
2865	A2
2867	C3
2869	F2
2870	J1
2871	I1
2872	I4
2873	I2
2875	I3
2876	A3
2877	J3
2878	J3
2879	E5
2881	I3
2882	B3
2884	E2
2885	D3
2887	C4
2888	E1
2891	G3
2892	E2
2893	J3
3700	C5
3705	D5
3706	C5
3707	C5
3708	C5
3709	A4
3711	B5
3712	B2
3713	I3
3714	H3
3715	H3
3716	A2
3717	A2
3718	C5
3727	B4
3728	B5
3730	B5
3731	C5
3740	C3
3741	C3
3742	B4
3743	B4
3744	C3
3746	B3
3750	B3
3751	B3
3800	D2
3801	D2
3802	D2
3803	D2
3805	D2
3806	D2
3807	D2
3808	D2
3809	D5
3811	D2
3812	G5
3814	C2
3815	D1
3819	B4
3820	E2
3821	E2
3822	E2
3823	F1
3824	F1
3825	G3
3826	E4
3827	D3
3828	F4
3831	C1
3832	A4
3833	F2
3834	F2
3835	H4
3837	E5
3838	E5
3839	E4
3840	E4
3841	E5
3842	E5
3843	G4
3844	G4
3845	E5
3846	G4
3847	G3
3848	E5
3849	E5
3850	E5
3851	J2
3852	G5
3853	E4
3854	C2
3855	B2
3857	G4
3858	C2
3859	B2
3860	B4
3861	B4
3862	C3
3863	D5
3864	B2
3866	F2
3867	C4
3868	B2
3869	G2
3870	G2
3871	I3
3872	A3
3873	B5
3874	A4
3875	C2
3876	A4
3877	I3
3878	D1
3879	J2
3880	I2
3881	I2
3882	J3
3883	J2
3884	J2
3885	J3
3886	J3
3887	I3
3888	I3
3889	B5
3890	I3
3891	J3
3892	B5
3893	I3
3894	D3
3895	D5
3896	H3
3897	F1
3899	C2
5802	A2
5803	J1
5804	I1
5805	A2
6871	H4
6872	I4
6873	J4
6874	H3
6875	I3
6876	C1
6877	A3
6878	H4
7801	F1
7805	B3
7806	H3
7807	F5
7812	H3
7871	J2
7873	J4
7874	C2
7875	C1
7876	C5
7877	C4
9801	I4
9802	B4
9803	B2
9805	D1
9806	F2
9807	G5
9808	F1
9811	G1
9812	G1
9813	C1
9815	A2
9816	A2
9817	A2
9818	B1
9819	B2
9820	B2
9821	B2
9822	B2
9823	D1
9824	C2
9825	H1
9827	C1
9830	D1
9831	C4
9832	E5
9833	H1
9834	D1
9835	A1
9836	D5
9837	J3
9838	A1
9839	A1
9841	E5
9842	E5
9844	F4
9845	D5
9850	C2
9851	D5
9852	E5
9853	E4
9855	E3
9856	E3
9857	G2
9858	G2
9859	G3
9861	G5
9862	G5
9864	F3
9876	C1
9884	G3
9885	G2
9888	H4
9889	H4
9898	J1
9899	I1

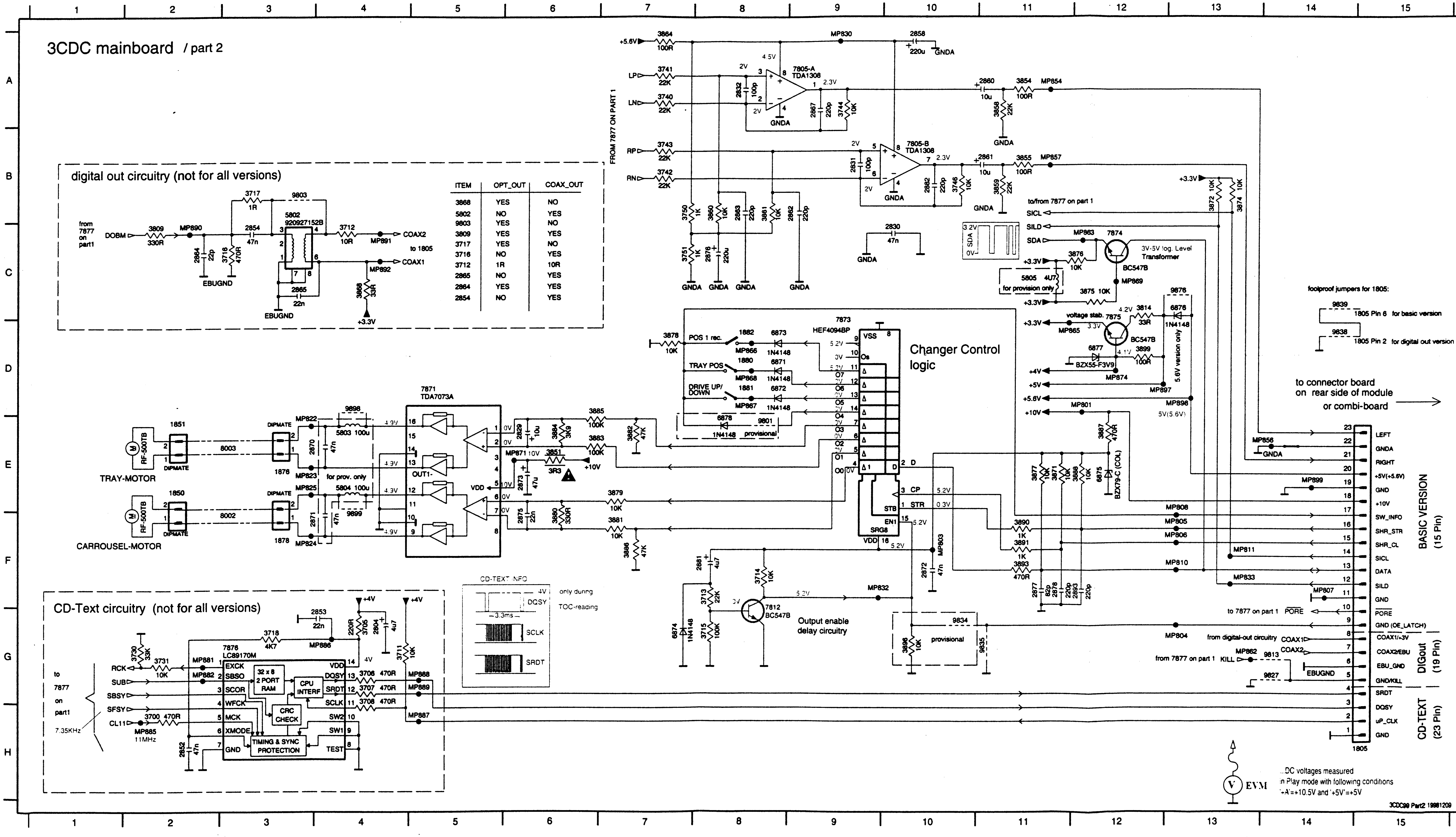
3CDC99 Board Copperside view



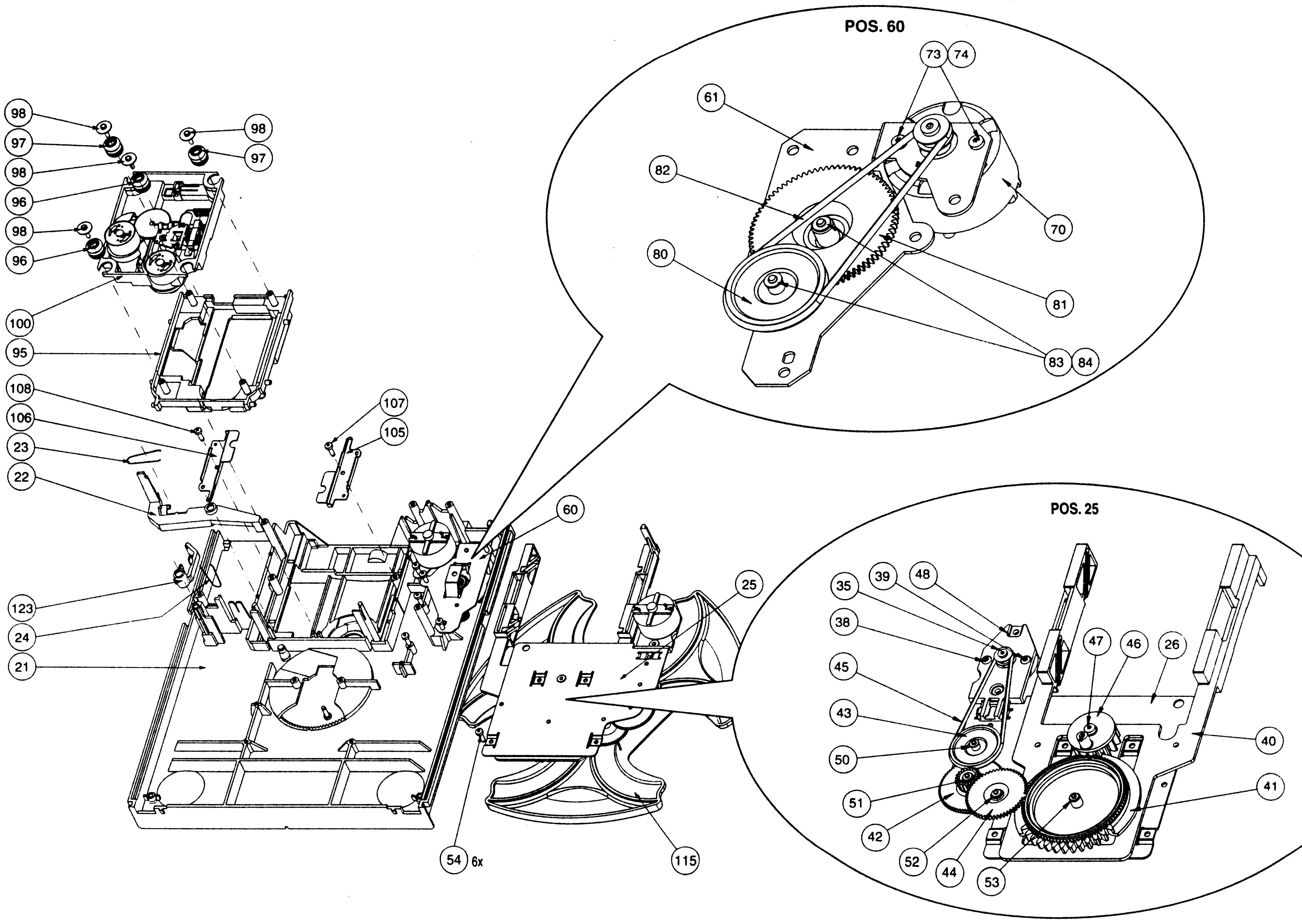
This assembly drawing shows a summary of all possible versions.
For components used in a specific version see schematic diagram respectively partslist.

1805	H14
1876	E3
1878	F3
1880	D8
1881	D8
1882	D8
2804	G4
2829	E6
2830	C10
2831	B9
2832	A8
2852	H2
2853	G4
2854	C3
2858	A10
2860	A11
2861	B11
2862	B8
2863	B8
2864	C2
2865	C3
2867	A9
2870	E3
2871	F4
2872	F10
2873	E6
2875	F6
2876	C8
2877	F11
2878	F11
2881	F8
2882	B10
2893	F12
3700	H2
3705	G4
3706	G4
3707	G4
3708	H4
3711	G4
3712	C4
3713	F8
3714	F8
3715	G8
3716	C3
3717	B3
3718	G3
3730	G2
3731	G2
3740	A7
3741	A7
3742	B7
3743	B7
3744	A9
3746	B10
3750	B7
3751	C7
3809	C2
3814	C12
3851	E6
3854	A11
3855	B11
3858	A11
3859	B11
3860	B8
3861	B8
3864	A7
3868	C4
3871	E11
3872	B13
3874	B13
3875	C12
3876	C12
3877	E11
3878	D7
3879	E7
3880	F6
3881	F7
3882	E7
3883	E6
3884	E6
3885	D6
3886	F7
3887	E12
3888	E12
3890	F11
3891	F11
3893	F11
3896	G10
3899	D12
5802	B3
5803	E4
5804	E4
5805	C11
6871	D8
6872	D8
6873	D8
6874	G7
6875	E12
6876	C13
6877	D12
6878	E8
7805-A	A9
7805-B	B10
7812	G8
7871	D5
7873	D9
7874	C12
7875	D12
7876	G3
9801	E8
9803	B3
9813	G14
9827	G14
9834	G10
9835	G11
9838	D14
9839	C14
9876	C13
9898	D4
9899	E4

3CDC mainboard / part 2

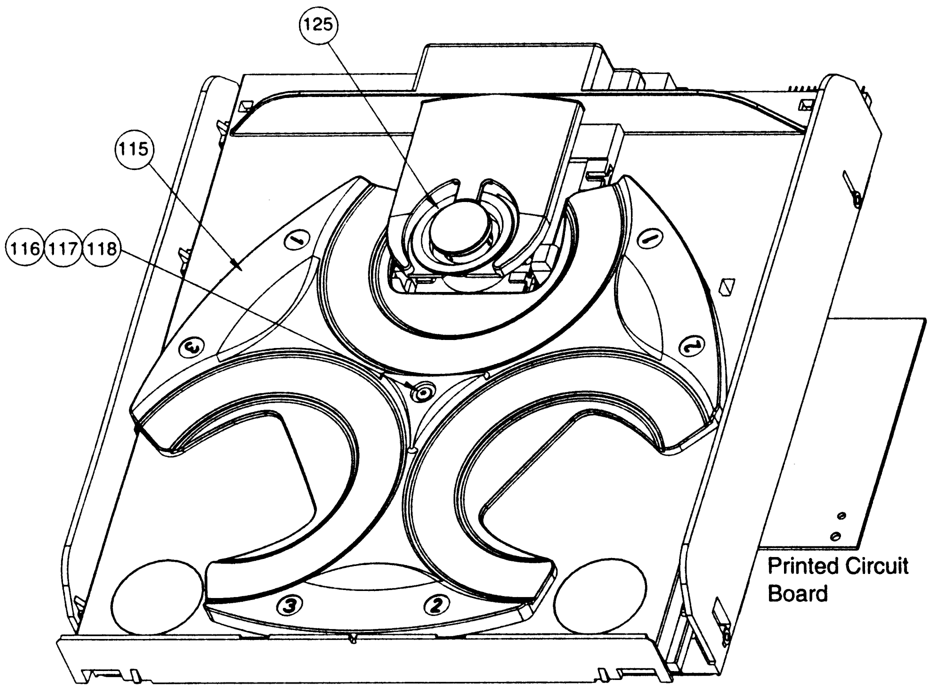

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
A
B
C
D
E
F
G
H
digital out circuitry (not for all versions)
from 7877 on part1
DOBM
3809 330R
MP890
3717 1R
9803
2854 47n
5802 920927152B
3712 10R
MP891
COAX2
to 1805
COAX1
MP892
2864 22p
3716 470R
EBUGND
2865 22n
3868 33R
+3.3V
FROM 7877 ON PART 1
+5.6V
3864 100R
MP830
2858 220u
GNDA
LP
3741 22K
LN
3740 22K
2832 100p
7805-A TDA1308
4.5V
2V
2.3V
2867 220p
3744 10K
2860 10u
3854 100R
MP854
3858 22K
RP
3743 22K
RN
3742 22K
2831 100p
7805-B TDA1308
2882 220p
3746 10K
2861 10u
3855 100R
MP857
3859 22K
3750 1K
3860 10K
2863 220p
3861 10K
2862 220p
3751 1K
2876 220u
2830 47n
to/from 7877 on part 1
SICL
SILD
SDA
MP863
7874
3V-5V log. Level Transformer
3876 10K
BC547B
MP869
5805 4U7
for provision only
3875 10K
+3.3V
3872 10K
3874 10K
9876
6876 1N4148
3814 33R
voltage stab. 7875
MP865
BC547B
6877 BZX55-F3V9
3899 100R
MP874
5.6V version only
+4V
+5V
+5.6V
+10V
MP801
MP897
MP896
5V(5.6V)
foolproof jumpers for 1805:
9839
1805 Pin 6 for basic version
9838
1805 Pin 2 for digital out version
to connector board on rear side of module or combi-board
3878 10K
POS 1 rec.
1882
6873
MP866 1N4148
TRAY POS
1880
6871
MP868 1N4148
DRIVE UP/DOWN
1881
6872
MP867 1N4148
6878 1N4148
9801 provisional
7873 HEF4094BP
VSS
Os
SRG8
STB
EN1
VDD
CP
STR
Changer Control logic
7871 TDA7073A
MP822
9898
5803 100u
2870 47n
OUT1-
VDD
MP823
for prov. only
MP825
5804 100u
9899
2871 47n
MP824
1851
RF-500TB
DIPMATE
8003
1876
TRAY-MOTOR
1850
8002
1878
CARROUSEL-MOTOR
2829 10u
3884 3K9
3885 100K
3882 47K
3883 100K
MP871
3851 3R3
+10V
2873 47u
3879 10K
2875 22n
3880 330R
3881 10K
3886 47K
2881 4u7
3714 10K
3713 22K
7812 BC547B
MP832
6874 1N4148
3715 100K
Output enable delay circuitry
2872 47n
MP803
9834
3896 10K
provisional
9835
3887 470R
6875 BZX79-C (COL)
3877 10K
3871 10K
3888 10K
3890 1K
3891 1K
3893 470R
2877 82p
2878 220p
2893 220p
MP808
MP805
MP806
MP810
MP811
MP833
MP807
MP804
MP856
MP899
CD-TEXT INFO
4V
DQSY
3.3ms
SCLK
SRDT
only during TOC-reading
CD-Text circuitry (not for all versions)
to 7877 on part1
RCK
SUB
SBSY
SFSY
CL11
7.35KHz
3730 33K
3731 10K
3700 470R
MP885 11MHz
MP881
MP882
7876 LC89170M
EXCK
SBSO
SCOR
WFCK
MCK
XMODE
GND
32 x 8 2 PORT RAM
CPU INTERF
CRC CHECK
TIMING & SYNC PROTECTION
VDD
DQSY
SRDT
SCLK
SW2
SW1
TEST
3718 4K7
MP886
2853 22n
3705 220R
2804 4u7
3711 10K
+4V
3706 470R
3707 470R
3708 470R
MP888
MP889
MP887
2852 47n
LEFT
GNDA
RIGHT
+5V(+5.6V)
GND
+10V
SW_INFO
SHR_STR
SHR_CL
SICL
DATA
SILD
GND
PORE
GND (OE_LATCH)
COAX1/+3V
COAX2/EBU
EBU_GND
GND/KILL
SRDT
DQSY
uP_CLK
GND
BASIC VERSION (15 Pin)
DIGout (19 Pin)
CD-TEXT (23 Pin)
1805
to 7877 on part 1 PORE
from digital-out circuitry COAX1
COAX2
from 7877 on part 1 KILL
MP862
9813
9827
EBUGND
EVM
...DC voltages measured in Play mode with following conditions '+A'=+10.5V and '+5V'=+5V
3CDC99 Part2 19981209

ITEM	OPT_OUT	COAX_OUT
3868	YES	NO
5802	NO	YES
9803	YES	NO
3809	YES	YES
3717	YES	NO
3716	NO	YES
3712	1R	10R
2865	NO	YES
2864	YES	YES
2854	NO	YES


POS. 60
73
74
61
82
80
70
81
83
84
98
97
98
97
98
96
98
96
100
95
108
106
23
22
107
105
60
123
24
21
25
54
6x
115
POS. 25
35
39
48
38
45
43
50
51
42
52
44
53
47
46
26
40
41

CS 53 195

10-13

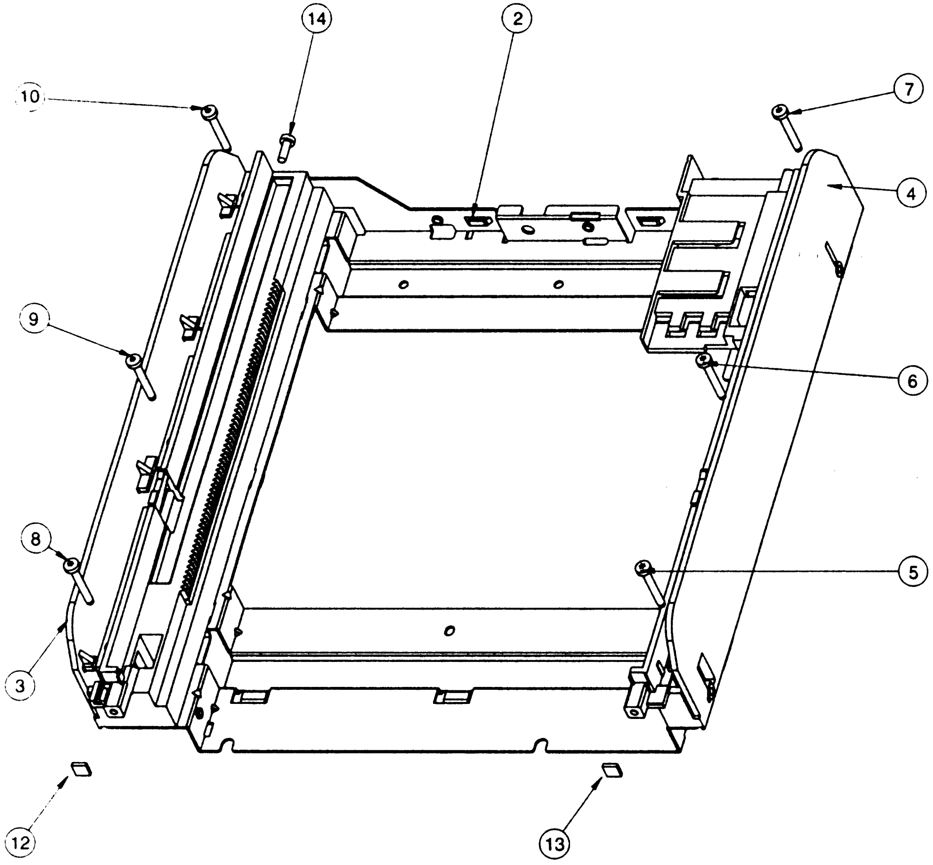

125
115
116
117
118
1
1
2
2
3
Printed Circuit Board

MECHANICAL PARTSLIST 3CDC-99 MODULE

	4822 390 10136	POLYLUB GLY801 (GREASE)
3	4822 463 11008	GUIDE LEFT
4	4822 463 11009	GUIDE RIGHT
21	4822 441 11615	DRAWER
22	4822 402 10088	BRACKET TUMBLER
38	4822 502 12548	SCREW M2,6X3,5
39	4822 502 12548	SCREW M2,6X3,5
40	4822 463 11011	SLIDE
41	4822 522 10509	CONTROL DISC
42	4822 522 10492	GEAR WHEEL
43	4822 528 10937	PULLEY
44	4822 522 10493	IDLER WHEEL
45	4822 358 10115	BELT
46	4822 466 10735	ECCENTRIC GEAR WHEEL
50	4822 532 12364	WASHER
51	4822 532 12364	WASHER
52	4822 532 12364	WASHER
53	4822 532 12364	WASHER
35	4822 361 10753	CARROUSEL MOTOR
70	4822 361 10753	CARROUSEL MOTOR

continued on next page

CS 53 196



MECHANICAL PARTSLIST 3CDC-99 MODULE

73	4822 502 12548	SCREW M2,6X3,5
74	4822 502 12548	SCREW M2,6X3,5
80	4822 528 10937	PULLEY
81	4822 522 10494	GEAR DRAWER
82	4822 358 10115	BELT
83	4822 532 12364	WASHER
84	4822 532 12364	WASHER
95	4822 404 10895	SUPPORT
96	4822 529 10431	SUSPENSION
97	4822 529 10431	SUSPENSION
100	4822 691 10772	CD DRIVE VAM2201
115	4822 466 10736	CARROUSEL
117	4822 532 12365	BUSH DRAWER
123	4822 402 11237	SWITCH BRACKET
125	4822 401 11708	DISC CLAMP

ELECTRICAL PARTSLIST 3CDC-99 MODULE

MISCELLANEOUS

1800	4822 265 10925	FLEX FOIL CONNECTOR 15PIN
1805	4822 265 11533	FLEX FOIL CONNECTOR 23PIN
1805	2422 025 09768	FLEX FOIL CONNECTOR 19PIN
1805	4822 267 51322	FLEX FOIL CONNECTOR 15PIN
1880	4822 276 13503	SWITCH
1881	4822 276 13503	SWITCH
1882	4822 276 13503	SWITCH
8001	4822 320 12659	FLEX FOIL 23PIN 480MM *
8001	4822 320 12729	FLEX FOIL 23PIN 400MM
8001	4822 320 12658	FLEX FOIL 19PIN 480MM
8001	4822 320 12232	FLEX FOIL 15PIN 480MM
8005	3103 308 91820	FLEX FOIL 15PIN 95MM

* will be replaced by shorter length (400mm) when stock is out.

CAPACITORS

2800	4822 126 10053	180pF	10%	50V
2801	4822 122 10466	220pF	10%	50V
2802	4822 126 10053	180pF	10%	50V
2803	4822 122 10466	220pF	10%	50V
2804	4822 124 40246	4,7µF	20%	63V
2805	4822 122 10466	220pF	10%	50V
2806	4822 122 10466	220pF	10%	50V
2807	4822 126 12787	330pF	10%	50V
2808	4822 122 10466	220pF	10%	50V
2809	5322 124 41948	0,47µF	20%	50V
2810	4822 126 10053	180pF	10%	50V
2811	4822 122 10466	220pF	10%	50V
2814	4822 126 12785	47nF	20%	50V
2815	4822 126 12882	100nF	20%	50V
2816	4822 126 12878	1,5nF	10%	16V
2818	4822 126 12878	1,5nF	10%	16V
2822	4822 126 12339	2,2nF	10%	16V
2823	4822 122 33848	47pF	5%	50V
2824	4822 126 11585	22nF	20%	50V
2825	4822 126 12785	47nF	20%	50V
2826	4822 124 80231	47µF	20%	16V
2828	4822 124 40433	47µF	20%	25V
2829	4822 124 21732	10µF	20%	25V
2830	4822 126 12785	47nF	20%	50V
2831	4822 122 33195	100pF	10%	50V
2832	4822 122 33195	100pF	10%	50V
2833	4822 122 33069	33pF	5%	50V
2834	4822 122 33069	33pF	5%	50V
2835	4822 126 12785	47nF	20%	50V
2837	4822 124 40433	47µF	20%	25V
2838	4822 124 41579	10µF	20%	50V
2839	4822 124 40433	47µF	20%	25V
2840	4822 126 12882	100nF	20%	50V
2841	4822 126 12702	270pF	10%	50V
2842	4822 126 12339	2,2nF	10%	16V
2844	4822 126 12702	270pF	10%	50V
2849	4822 124 40246	4,7µF	20%	63V
2850	4822 122 33197	1nF	10%	50V
2851	4822 124 40196	220µF	20%	16V
2852	4822 126 12785	47nF	20%	50V
2853	4822 126 11585	22nF	20%	50V
2854	4822 126 12785	47nF	20%	50V
2855	4822 122 33519	470pF	10%	50V
2856	4822 122 33848	47pF	5%	50V
2857	4822 121 51387	10nF	20%	16V
2858	4822 124 40196	220µF	20%	16V
2859	4822 121 51387	10nF	20%	16V
2860	4822 124 41579	10µF	20%	50V
2861	4822 124 41579	10µF	20%	50V

CAPACITORS

2862	4822 122 10466	220pF	10%	50V
2863	4822 122 10466	220pF	10%	50V
2864	4822 122 33191	22pF	5%	50V
2865	4822 126 11585	22nF	20%	50V
2867	4822 122 10466	220pF	10%	50V
2869	4822 126 12785	47nF	20%	50V
2872	4822 126 12785	47nF	20%	50V
2873	4822 124 12233	47µF	20%	25V
2875	4822 126 11585	22nF	20%	50V
2876	4822 124 40196	220µF	20%	16V
2877	4822 122 10319	82pF	5%	50V
2878	4822 122 10466	220pF	10%	50V
2879	4822 126 12785	47nF	20%	50V
2882	4822 122 10466	220pF	10%	50V
2884	4822 124 40246	4,7µF	20%	63V
2885	4822 124 40246	4,7µF	20%	63V
2887	4822 126 12882	100nF	20%	50V
2888	4822 124 40246	4,7µF	20%	63V
2891	4822 122 10576	1,8nF	10%	16V
2892	4822 126 11714	4,7nF	20%	16V
2893	4822 122 10466	220pF	10%	50V

RESISTORS

3700	4822 116 83883	470Ω	5%	0,16W
3705	4822 116 83872	220Ω	5%	0,5W
3706	4822 116 83883	470Ω	5%	0,16W
3707	4822 116 83883	470Ω	5%	0,16W
3708	4822 116 83883	470Ω	5%	0,16W
3709	4822 116 83864	10kΩ	5%	0,5W
3711	4822 116 83864	10kΩ	5%	0,5W
3712	4822 116 52176	10Ω	5%	0,5W
3713	4822 116 52257	22kΩ	5%	0,5W
3714	4822 116 83864	10kΩ	5%	0,5W
3715	4822 116 52234	100kΩ	5%	0,5W
3716	4822 116 83883	470Ω	5%	0,16W
3718	4822 116 52283	4,7kΩ	5%	0,5W
3727	4822 116 52283	4,7kΩ	5%	0,5W
3728	4822 116 52283	4,7kΩ	5%	0,5W
3730	4822 116 52271	33kΩ	5%	0,16W
3731	4822 116 83864	10kΩ	5%	0,5W
3740	4822 116 52257	22kΩ	5%	0,5W
3741	4822 116 52257	22kΩ	5%	0,5W
3742	4822 116 52257	22kΩ	5%	0,5W
3743	4822 116 52257	22kΩ	5%	0,5W
3744	4822 116 83864	10kΩ	5%	0,5W
3746	4822 116 83864	10kΩ	5%	0,5W
3750	4822 050 11002	1kΩ	5%	0,2W
3751	4822 050 11002	1kΩ	5%	0,2W
3800	4822 116 52291	56kΩ	5%	0,5W
3801	4822 116 83864	10kΩ	5%	0,5W
3802	4822 116 52291	56kΩ	5%	0,5W
3803	4822 116 83864	10kΩ	5%	0,5W
3805	4822 116 83864	10kΩ	5%	0,5W
3806	4822 116 83864	10kΩ	5%	0,5W
3807	4822 116 83864	10kΩ	5%	0,5W
3808	4822 116 83864	10kΩ	5%	0,5W
3809	4822 116 83876	270Ω	5%	0.16W
3811	4822 116 52251	18kΩ	5%	0,5W
3812	4822 053 10228	2,2Ω	5%	1W
3814	4822 116 52191	33Ω	5%	0,5W
3815	4822 052 10478	4,7Ω	5%	NFR
3819	4822 116 83883	470Ω	5%	0,16W
3820	4822 116 52283	4,7kΩ	5%	0,5W
3821	4822 116 52283	4,7kΩ	5%	0,5W

ELECTRICAL PARTSLIST 3CDC-99 MODULE

RESISTORS

3822	4822 116 52249	1,8kΩ	5%	0.16W
3823	4822 050 11002	1kΩ	5%	0.2W
3824	4822 050 11002	1kΩ	5%	0.2W
3825	4822 050 11002	1kΩ	5%	0.2W
3826	4822 116 52257	22kΩ	5%	0.5W
3827	4822 116 52271	33kΩ	5%	0.16W
3828	4822 116 52257	22kΩ	5%	0.5W
3831	4822 116 52257	22kΩ	5%	0.5W
3832	4822 116 83864	10kΩ	5%	0.5W
3833	4822 116 52257	22kΩ	5%	0.5W
3834	4822 116 52257	22kΩ	5%	0.5W
3835	4822 052 10338	3,3Ω		NFR25
3837	4822 050 11002	1kΩ	5%	0.2W
3838	4822 050 11002	1kΩ	5%	0.2W
3839	4822 116 52234	100kΩ	5%	0.5W
3840	4822 116 52234	100kΩ	5%	0.5W
3841	4822 116 52283	4,7kΩ	5%	0.5W
3842	4822 116 83884	47kΩ	5%	0.16W
3843	4822 116 52271	33kΩ	5%	0.16W
3844	4822 116 52283	4,7kΩ	5%	0.5W
3845	4822 116 83884	47kΩ	5%	0.16W
3846	4822 116 52271	33kΩ	5%	0.16W
3847	4822 116 83961	6,8kΩ	5%	0.16W
3848	4822 116 52234	100kΩ	5%	0.5W
3849	4822 116 52234	100kΩ	5%	0.5W
3850	4822 116 52276	3,9kΩ	5%	0.5W
3851	4822 052 10338	3,3Ω		NFR25
3852	4822 052 10228	2,2Ω	5%	0,33W
3853	4822 116 83883	470Ω	5%	0.16W
3854	4822 116 52175	100Ω	5%	0,5W
3855	4822 116 52175	100Ω	5%	0,5W
3857	4822 116 52191	33Ω	5%	0.5W
3858	4822 116 52257	22kΩ	5%	0.5W
3859	4822 116 52257	22kΩ	5%	0,5W
3860	4822 116 83864	10kΩ	5%	0.5W
3861	4822 116 83864	10kΩ	5%	0.5W
3862	4822 116 52175	100Ω	5%	0,5W
3863	4822 116 52175	100Ω	5%	0,5W
3863	4822 116 52191	33Ω	5%	0,5W
3864	4822 116 52175	100Ω	5%	0,5W
3866	4822 116 83864	10kΩ	5%	0,5W
3867	4822 116 83868	150Ω	5%	0.5W
3869	4822 050 24708	4,7Ω	1%	0.6W
3870	4822 116 52175	100Ω	5%	0.5W
3871	4822 116 83864	10kΩ	5%	0.5W
3872	4822 116 83864	10kΩ	5%	0,5W
3873	4822 116 83883	470Ω	5%	0,16W
3874	4822 116 83864	10kΩ	5%	0.5W
3875	4822 116 83864	10kΩ	5%	0.5W
3876	4822 116 83864	10kΩ	5%	0.5W
3877	4822 116 83864	10kΩ	5%	0.5W
3878	4822 116 83864	10kΩ	5%	0.5W
3879	4822 116 83864	10kΩ	5%	0,5W
3880	4822 116 52219	330Ω	5%	0.5W
3881	4822 116 83864	10kΩ	5%	0.5W
3882	4822 116 83884	47kΩ	5%	0,16W
3883	4822 116 52234	100kΩ	5%	0.5W
3884	4822 116 52276	3,9kΩ	5%	0,5W
3885	4822 116 52234	100kΩ	5%	0.5W
3886	4822 116 83884	47kΩ	5%	0,16W
3887	4822 116 83883	470Ω	5%	0,16W
3888	4822 116 83864	10kΩ	5%	0.5W
3889	4822 116 83883	470Ω	5%	0,16W
3890	4822 050 11002	1kΩ	5%	0,2W
3891	4822 050 11002	1kΩ	5%	0,2W

RESISTORS

3892	4822 116 83883	470Ω	5%	0,16W
3893	4822 116 83883	470Ω	5%	0,16W
3894	4822 116 52191	33Ω	5%	0,5W
3895	4822 116 52176	10Ω	5%	0,5W
3897	4822 116 52175	100Ω	5%	0,5W
3899	4822 116 52175	100Ω	5%	0,5W

COILS

1810	4822 242 10849	QUARTZ 8,46MHz
1810	4822 242 73557	CERAMIC RES. 8,46MHz
5802	4822 156 31058	FILTER DIGITAL OUT

DIODES

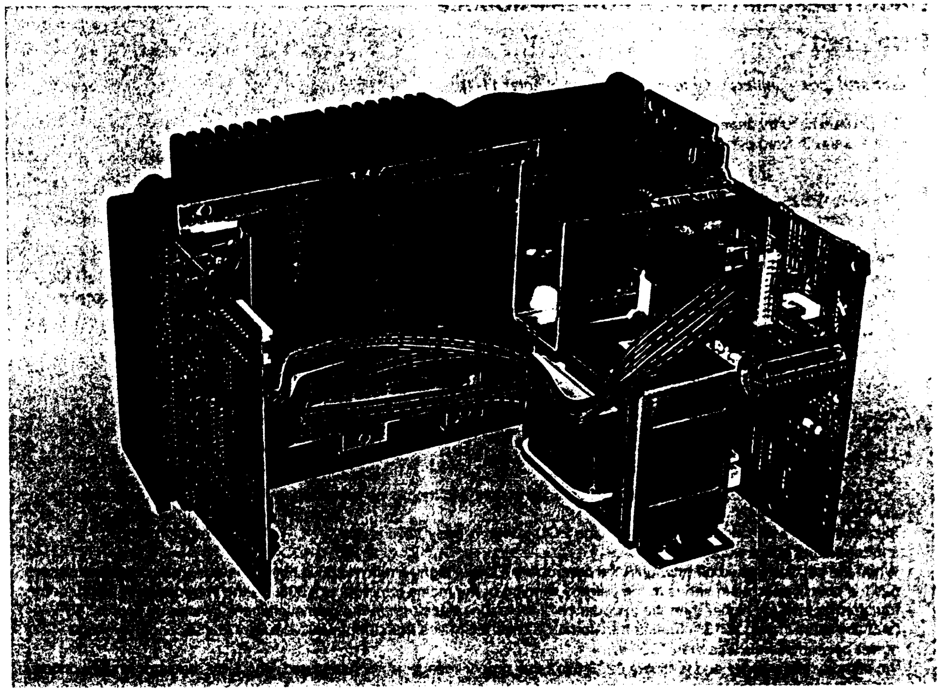
6871	4822 130 30621	1N4148
6872	4822 130 30621	1N4148
6873	4822 130 30621	1N4148
6874	4822 130 30621	1N4148
6875	4822 130 34233	BZX79-B5V1
6877	4822 130 31981	BZX79-C3V9

TRANSISTORS

7812	4822 130 40959	BC547B
7874	4822 130 40959	BC547B
7875	4822 130 40959	BC547B

INTEGRATED CIRCUITS

7801 ©	4822 209 17286	TZA1024T/N1 HF-AMPLIFIER
7805	4822 209 17284	TDA1308 OPAMP
7806	4822 209 32852	TDA7073A/N2 SERVO DRIVER
7807	4822 209 32852	TDA7073A/N2 MOTOR DRIVER
7871	4822 209 32852	TDA7073A/N2 MOTOR DRIVER
7873	5322 209 10421	HEF4094BP SHIFT REGISTER
7876 ©	4822 209 16143	LC89170M CD TEXT
7877 ©	4822 209 17285	SAA7324H/M1 SIGNAL PROCESSOR



POWER 4-99 Module

(2 Channel Version)

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Circuit description 11-2
Component layout 11-6
Circuit diagram Supply part 11-7
Component layout 11-8
Circuit diagram Power stage 11-9
Partslist 11-10

CIRCUIT DESCRIPTION FOR POWER4-MODULE

Supply-part

General *(pos. numbers refer to circuit diagram chapter 11-7)*

The primary circuitry depends on the version:

- Versions with fixed primary voltage: 100VAC for /26
  120VAC for /37
  220-240VAC for /22/25/30/33/34
  Versions /22/25/26/37 use radial type-fuse 1201, versions /30/33/34 use glass tube fuse 1202.
  For correct replacement see service printing on printed board respectively version table in circuit diagram or partslist.

- Version with switchable primary voltage: 110-127/220-240VAC for /21
  In version /21 voltage selector 1210 is built-in and each primary winding is protected separately (fuses 1201 and 1200).
  For correct replacement see service printing on printed board respectively version table in circuit diagram or partslist.

- European versions – "*low power standby feature*"
  For detailed description see below.

Circuit details:

- **Low power standby feature**

An additional small standby transformer, connected in series to the mains transformer, reduces power consumption in standby-mode.
In case power is switched on, the control line ECO is low → relay 1208 is activated → standby transformer 5211 is shortened and out of work.
When the set is switched off (standby) the control line ECO is high → relay 1208 is not activated → standby transformer 5211 is now connected in series to the primary winding of the mains transformer 1008. As the impedance of the standby transformer is much higher than the impedance of the mains transformer, the mainsvoltage is divided by approx. 85% (standby transformer) to 15% (mains transformer). Thus the mains transformer delivers very low secondary voltage → power consumption is less than 100mW.
Via standby transformer and rectifiers 6209-6212 the supply voltage +C is substituted. The 5,6V regulator is still working and so the microprocessor is kept running.

- **DC voltages +A, +B1/+B2, +C**

These voltages supply the Super Class G amplifier, described later in this chapter.
The whole power supply is optimized for the special characteristic of this type of amplifier. For that reason several "tricky" details have been applied to ensure optimal efficiency and symmetrical load to the mains transformer.

Generation of +A

Common full wave rectifying with bridge rectifier 6201, using 100% secondary winding of mains transformer (pin 11-15).

Generation of +B1/+B2

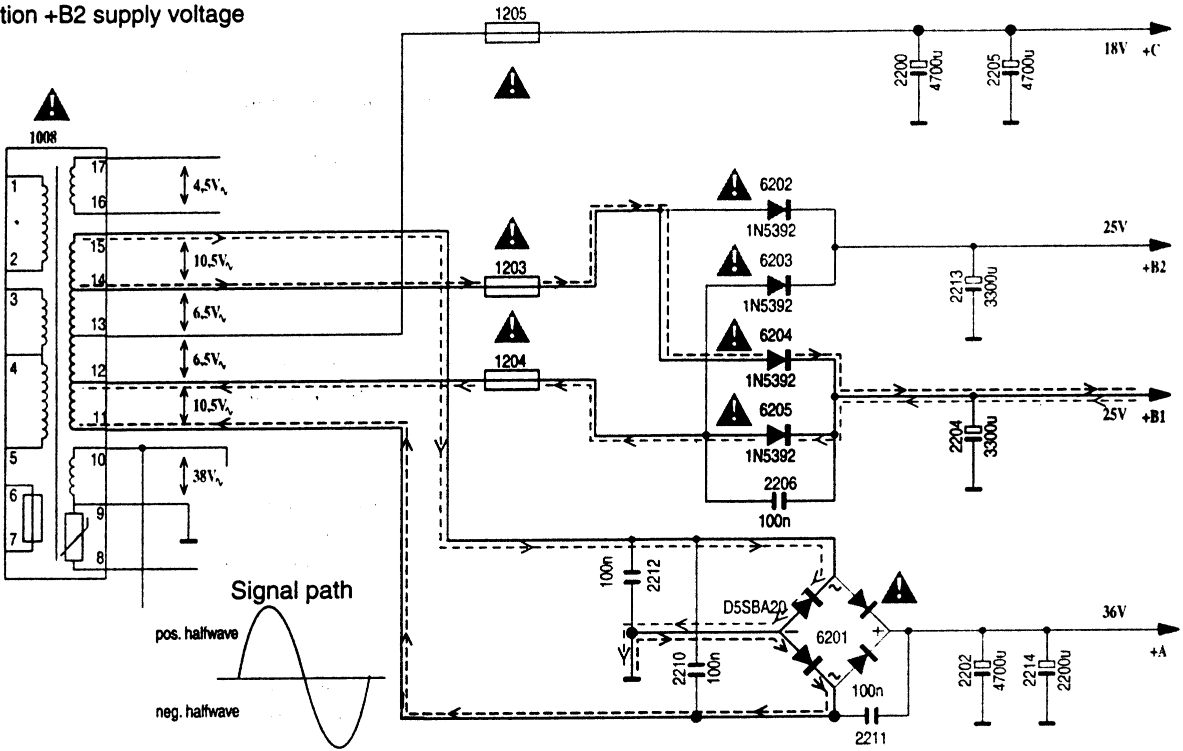
The power supply is designed to cover both, 2-channel and 4-channel application.
While for 2-channel application only one supply voltage +B1 is sufficient, 4-channel application requires an additional supply part +B2 which supplies the Center/Surround-amplifiers and the +12V-regulator (current required by 4 amplifiers would overload a single rectifier).

The supply for 2-channel versions consists of one full wave rectifier:
- 2 diodes of bridge rectifier 6201, with 6204/6205 for generation of +B1
- +B2 is connected in parallel with a bridge wire.

The supply for 4-channel versions consists of two separate full wave rectifiers:
- 2 diodes of bridge rectifier 6201, with 6204/6205 (for +B1) and
- 2 diodes of bridge rectifier 6201, with 6202/6203 (for +B2),

using approx. 70% secondary winding of mains transformer (pin 11-14 respectively pin 12-15).
As example for generation of +B2 see picture 1.

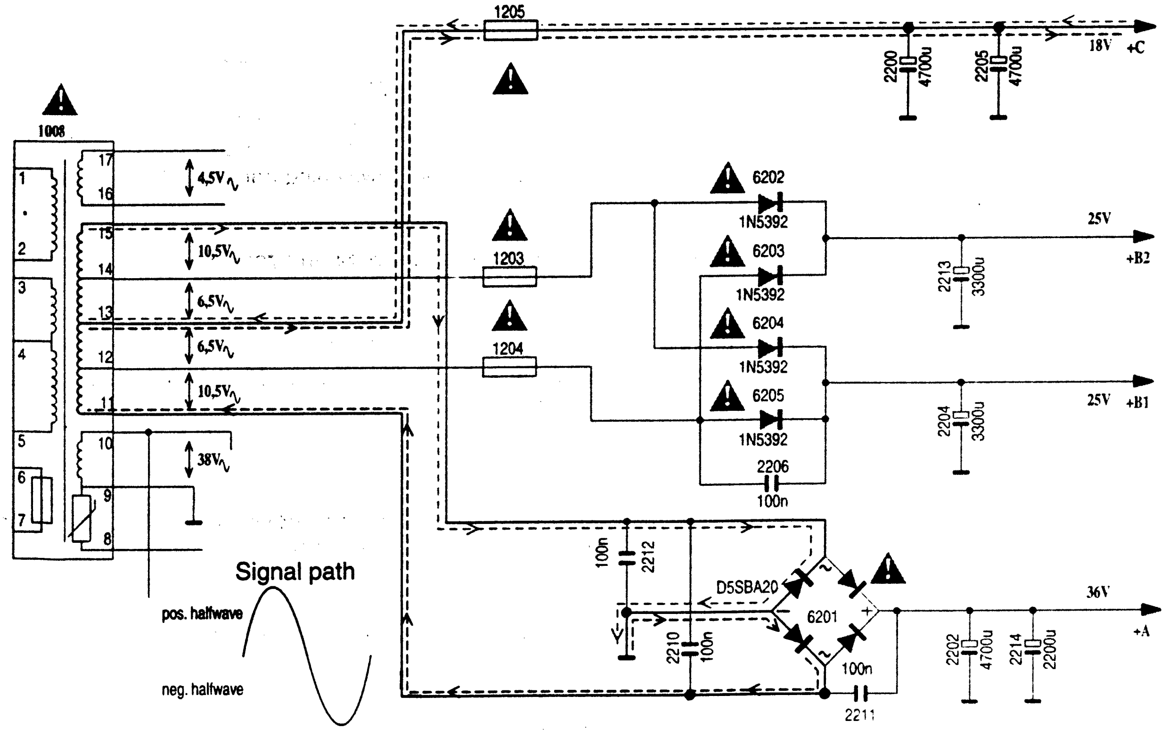
Generation +B2 supply voltage


1205
18V +C
2200 4700u
2205 4700u
1008
17
16
4,5V
15
14
13
12
11
10
9
8
10,5V
6,5V
6,5V
10,5V
38V
1203
1204
6202 1N5392
6203 1N5392
6204 1N5392
6205 1N5392
2206 100n
25V +B2
2213 3300u
25V +B1
2204 3300u
2212 100n
2210 100n
D5SBA20
6201
36V +A
2202 4700u
2214 2200u
2211 100n
Signal path
pos. halfwave
neg. halfwave

picture 1

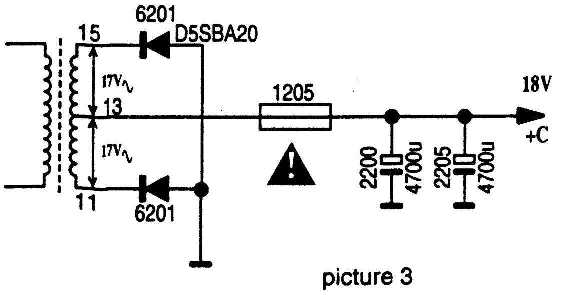
Generation of +C

Full wave rectifying with 2 diodes of bridge rectifier 6201, using 50% secondary winding of mains transformer (pin 13-15/13-11). See pictures 2 and 3 below.


1205
18V +C
2200 4700u
2205 4700u
1008
4,5V
10,5V
6,5V
6,5V
10,5V
38V
1203
1204
6202 1N5392
6203 1N5392
6204 1N5392
6205 1N5392
2206 100n
25V +B2
2213 3300u
25V +B1
2204 3300u
2212 100n
2210 100n
D5SBA20
6201
36V +A
2202 4700u
2214 2200u
2211 100n
Signal path
pos. halfwave
neg. halfwave

picture 2

Simplified


6201
D5SBA20
15
17V
13
17V
11
6201
1205
18V
+C
2200 4700u
2205 4700u

picture 3

Circuit details (continoued):

- **Supply voltages for FTD** (Fluorescent Tube Display)
  The FTD requires two supply voltages, delivered by separate windings of the mains transformer:
  - 4,5VAC for FTD heating (transformer pin 16/17)
  - -30V stabilized by the -30V regulator located on the amplifier part. The supply part delivers -35V unstabilized (transformer pin 9/10), typical value: -35V...-45V.

- **Stabilized +5V6**
  Stabilizer 7201 generates the supply voltage +5V6 for the microprocessor. In fault condition the output voltage can rise up to approx. 17V, which would definitely damage the device. Therefore an overvoltage protection for the +5V6 supply is implemented.
  Whenever the output of stabilizer rises above 7,5V, the base of 7202 reaches 0,7V (7,5V - voltage drop on 6207), the transistor switches through and short circuits the input voltage. This causes the safety resistor 3204 to blow out and interrupt immediately.

- **Temperature monitoring**
  The mains transformer is equipped with a NTC, embedded in the secondary winding (pin 8/9). Via the NTC line the temperature of the mains transformer is continuously monitored by the microprocessor. Further actions depend on the software of the set. Usually the set will be switched to standby mode when the transformer is overheated.

- **Power down (PWDN) monitoring**
  In order to enable proper switch off conditions the mains supply is monitored by the microprocessor via the PWDN line.
  In case of mains supply interrupts the PWDN line becomes low, while the +5V6 is still stable. This enables the microprocessor to take actions for a save shut-down (e.g. mute, reset of electronics, release of head support of tape deck).

Amplifier part

+12V-regulator *(pos. numbers refer to circuit diagram chapter 11-9)*

Is used to supply all motors (+12M) and all analogue circuits (+12A) in the set. +12C is provisional only.

- **Power on/off:**
  Switching on/off is done via the STBY-line from the microprocessor. H=ON, L=OFF
  If the STBY line is high - transistor 7222 is conductive. Base of 7224 becomes less positive than the emitter. This causes transistor 7224 to switch trough and supply the base of 7221. Consequently 7221 swiches trough too.
  Via 3218 transistor 3228 is conductive as soon as B2 is available. Consequently switching transistor 7227 is also switched through.

  If the STBY line is switched to low level base current for 7222 is blocked. In turn 7224 and 7221 are blocked. → OFF.

- **Regulation:**
  Key components are power-transistor 7221, reference diode 6221 and transistor 7223.
  After power is switched on via the STBY line as described above the +12A increases until 7223 becomes conductive via reference diode 6221 → 7223 reduces base current of 7221 → +12A is stable (typical +12,4V).
  In normal operating mode 7227 is always switched trough as described above.

- **Protections:**
  In case of overcurrent (typical 2,5A) 7227 gets out of saturation → 7226 becomes conductive → 7225 becomes conductive via 6225 → 7228 is blocked (no base current anymore) → 7227 is blocked too → no +12V.
  Restarting is only possible with power OFF→ ON.

  In case of overvoltage (more than +15V on emitter of 7221) 7225 is now activated via 6233 → 7228 is blocked (no base current anymore) → 7227 is blocked too → no +12V.

  These protections are implemented for saving the set-electronic in any fault-condition.

-30V-regulator

- Grid supply for the FTD switched by the microprocessor.
  Simple regulation with 6251 as reference. Typical value: -29V. Maximum current: 30mA

Circuit details (continoued):

VCD- Supply:

Is a provision for versions with a Video CD Player.

This circuitry consists of a switched supply with a regulator to 5,1V (±0,15V).

- **Switching on/off** is done via the VCD_ON line from the microprocessor (H=on, L=off). If the VCD_ON line is high - transistor 7236 becomes conductive. This causes transistor 7238 to switch through. +5VCD is available. If the VCD_ON is low - transistor 7236 is blocked → no base current through 7238 → transistor 7238 is blocked too → +5VCD is switched off.

- **Regulation** is done via Z- diode 6244 and transistor 7237.
  If the +5VCD exceeds 5,1V the basis of transistor 7237 becomes higher than 0,6V via Z- diode 6244. Consequently transistor 7237 becomes conductive. This causes a reduced base current through 7236. Transistor 7236 becomes less conductive and reduces the base current trough 7238. Transistor 7238 becomes less conductive too and reduces the +5VCD.

Amplifier:

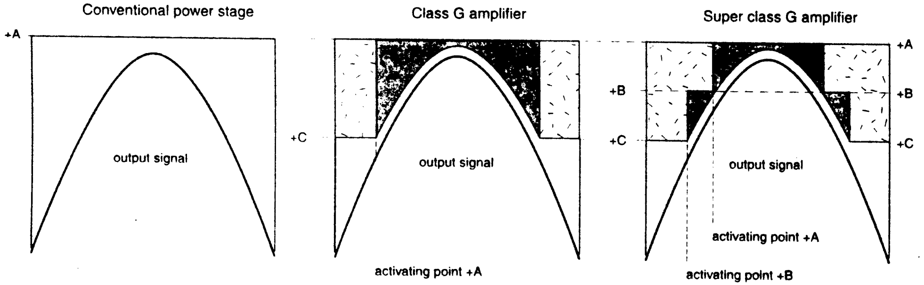
Attention: In the POWER 4 module the power amplifier IC AN7164 is used as a bridge-amplifier.
Any connection from output to ground will destroy the outpout stages!

- Via the AMP_ON control line, connected to pins 6 (Stby), the power amplifiers are switched on/off by the µP.
  High level (approx. 4,5V): power amplifiers switched on
  Low level (approx. 0V): power amplifiers switched off

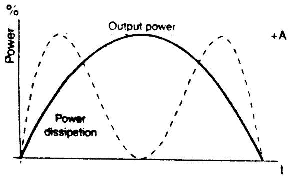
- Super class G - operation

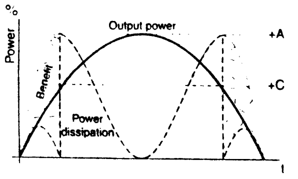
  The power amplifiers operate as so-called super class G - amplifiers:
  The supply pins 12 (Vcc) are not just connected to one fixed DC-supply as in conventional amplifiers.
  Dependent on the output power there are three different DC-voltages supplied to the power amplifiers:
  ⇒ +C (+18V) for low output power
  ⇒ +B (+25V) for medium output power
  ⇒ +A (+36V for high output power

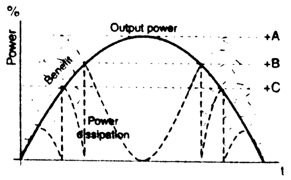
Principle / benefit of Super Class G


Conventional power stage
Class G amplifier
Super class G amplifier

☐ Voltage drop on power stage IC
▩ Voltage drop on switching transistor(s)
▧ Benefit - voltage drop on switching transistor(s) reduces total power dissipation







- advantages: - best efficiency
  - less power drawn from the mains transformer than by conventional operating amplifiers reduces transformer heating.
  - reduced power dissipation at the amplifier ICs results in
    - less junction temperature and better reliability
    - possibility of higher output power with smaller cooling fin
    - smaller size

- Functional description of the super class G - circiuitry used in Power4-module

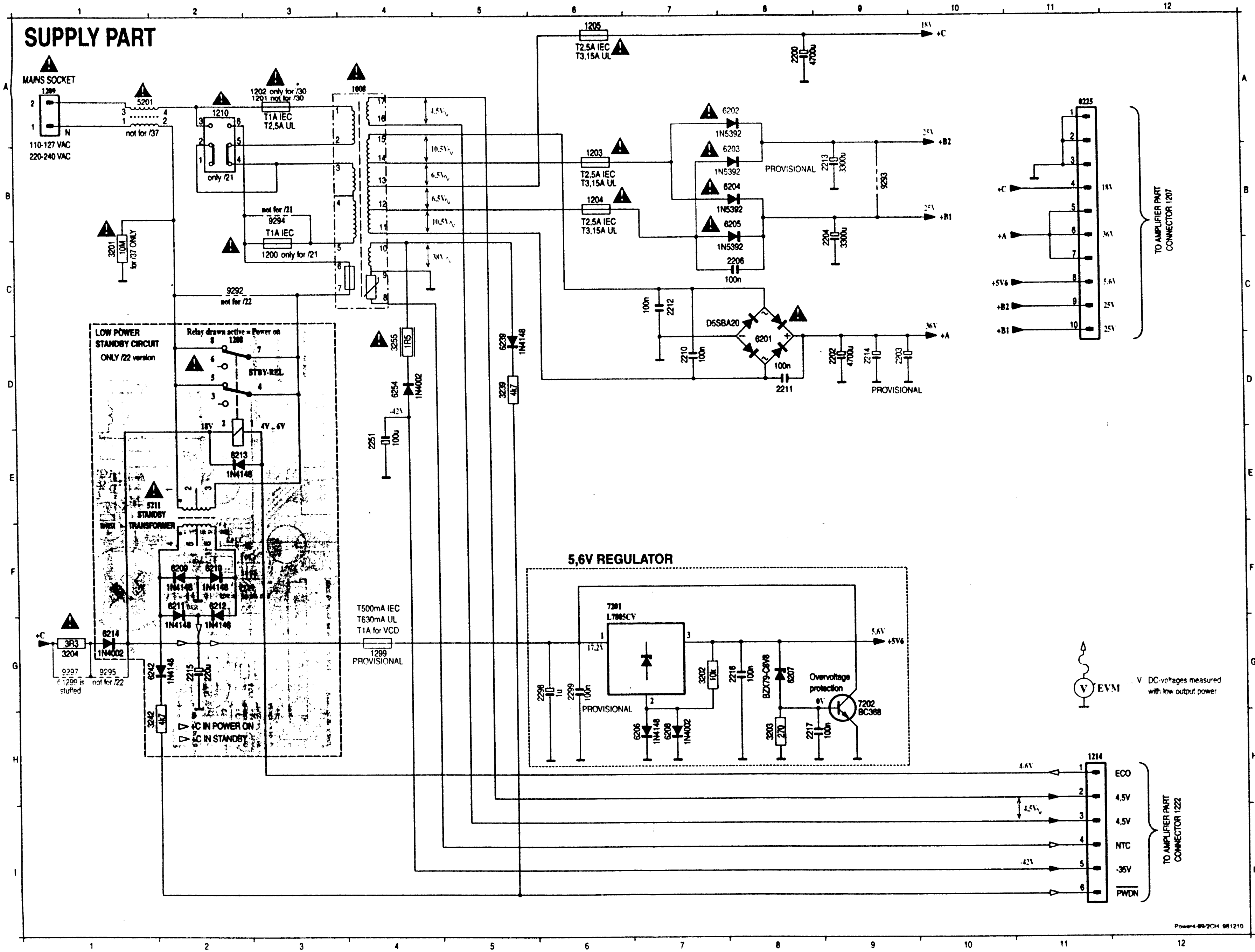
  The DC-level on the amplifier output pins is normally Vcc/2.
  With low signals +C is supplying the amplifiers via decoupling diode 6312. The DC-level on the output pins is therefore approx. 8,6V and approx. 8V on the base of 7315.
  When the output signal increases, also DC-level on base of 7315 increases via diodes 6305, 6306, 6307 and 6308. At a certain output power 7315 becomes slightly conductive and enables low base current for 7304 which becomes conductive too and pulls gate of FET 7303 up to a more positive level. Thus FET 7303 begins to switch through and connects the higher DC supply +B1 slowly to the power stages.
  This does not end up in a hard switching but in a smooth regulating because Vcc is coupled back to the emitter of 7315 via Zener diode 6310. As soon as Vcc increases also the level on emitter 7315 is increased by a 3,9V lower level than Vcc.
  When the output power is increased further +B1 would not be high enough to enable undistorted output signal. The more the output level increases the more increases the DC-level on base of 7315 which causes the transistor more and more conducting until the summary of the voltage drop on 3340+E/B 7304+3342 becomes approx. 1,4V. Now the necessary VBE for a darlington-type transistor is obtained, 7305 begins to switch through and connects the again higher DC supply +A slowly to the power stages. 7305 regulates +A, same as described before for +B.
  7322 and 7316 switch the ripple capacitor 2355, dependent on the output power.
  With low output power the DC-level on base 7322 is approx. 8V. Via Zener diode 6310 and resistor 3333 the emitter is pulled to Vcc (+C at low levels). 7322 is switched through and in turn 7316. The ripple capacitor 2325 is connected to ground and functions as in normal amplifiers. Hum is suppressed and good S/N-ratio is guaranteed even during silent music passages.
  When the supply voltage has to be switched to a higher level the DC-level of the ripple capacitor has to increase in the same relation, otherwise the reference voltages inside the IC would not fit to the actual Vcc. Because of the different delays this relation cannot be obtained and a continuously connected capacitor to the ripple input would cause distortion. For that reason the ripple capacitor 2325 is disconnected as soon as the output power exceeds a certain value. When the output signal increases, also DC-level on base of 7322 increases via diodes 6305, 6306, 6307 and 6308. 7322 blocks and in turn 7316. The ripple capacitor 2325 is disconnected from ground. The circuitry is designed so that 2325 is disconnected just before 7303 begins to switch +B through (see above).

- For Center/Surround-amplifier the function of the Super Class G circuit is similar. Instead of +B1 there +B2 is connected.

- For the /37-versions with two channel-application the so called MATRIX SURROUND is added. The 2 surround-speakers are added in a way, that in case of STEREO a high signal can be measured (up to 10W per speaker at 6 Ohm). In MONO only a few 100mW are available. Result: The widening of the STEREO base is increased without any additional electronic or amplifier.

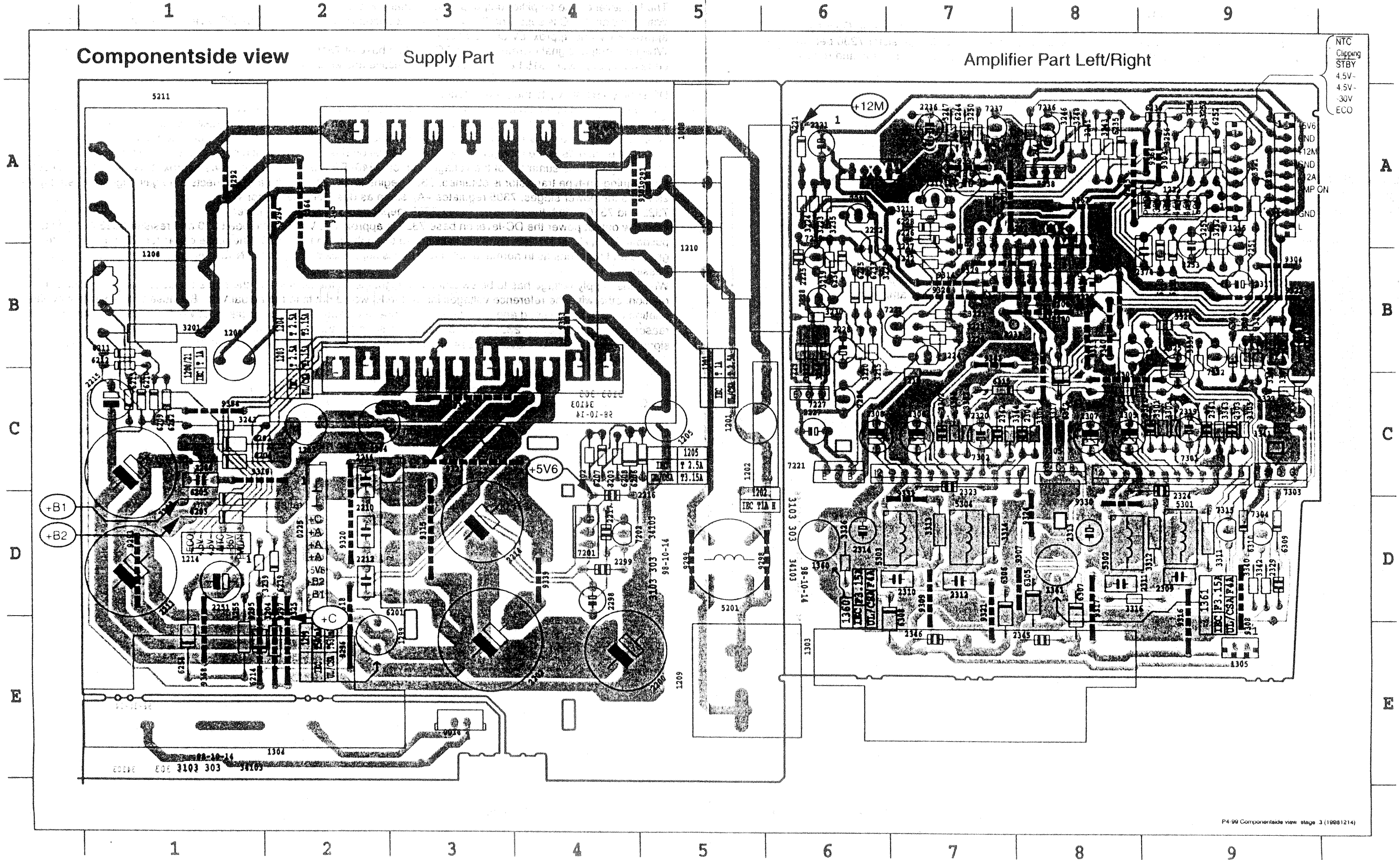
- In all four channel versions a pre-amplifier out for SURROUND is available to add a wireless speaker system (e.g. FB206,FB208).

SUPPLY PART


MAINS SOCKET
1209
N
110-127 VAC
220-240 VAC
5201
not for /37
1210
only /21
1202 only for /30
1201 not for /30
T1A IEC
T2,5A UL
1008
not for /21
9294
T1A IEC
1200 only for /21
3201
10M
for /37 ONLY
9292
not for /22
1205
T2,5A IEC
T3,15A UL
18V
+C
2200
4700u
6202
1N5392
6203
1N5392
6204
1N5392
6205
1N5392
2206
100n
25V
+B2
+B1
PROVISIONAL
2213
3300u
9293
2204
3300u
1203
T2,5A IEC
T3,15A UL
1204
T2,5A IEC
T3,15A UL
4,5V
10,5V
6,5V
6,5V
10,5V
38V
2212
100n
2210
100n
D5SBA20
6201
2211
100n
36V
+A
2202
4700u
2214
2203
PROVISIONAL
0225
+C
+A
+5V6
+B2
+B1
18V
36V
5,6V
25V
25V
TO AMPLIFIER PART
CONNECTOR 1207
LOW POWER
STANDBY CIRCUIT
ONLY /22 version
Relay drawn active = Power on
1208
STBY-REL
18V
4V - 6V
6213
1N4148
5211
STANDBY
TRANSFORMER
6209
1N4148
6210
1N4148
6211
1N4148
6212
1N4148
3255
1R5
6254
1N4002
-42V
2251
100u
6239
1N4148
3239
4k7
+C
3R3
3204
6214
1N4002
9297
if 1299 is stuffed
9295
not for /22
6242
1N4148
2215
220u
3242
4k7
+C IN POWER ON
+C IN STANDBY
T500mA IEC
T630mA UL
T1A for VCD
1299
PROVISIONAL
5,6V REGULATOR
7201
L7805CV
17,2V
2298
1u
2299
100n
PROVISIONAL
6206
1N4148
6208
1N4002
3202
10k
2216
100n
BZX79-C6V8
6207
3203
270
2217
100n
Overvoltage protection
0V
7202
BC368
5,6V
+5V6
V
EVM
....V DC-voltages measured with low output power
1214
4.6V
4,5V
-42V
ECO
4,5V
4,5V
NTC
-35V
PWDN
TO AMPLIFIER PART
CONNECTOR 1222
Power4-99/2CH 981210

0225	A11
1008	A 4
1200	B 3
1201	A 3
1202	A 3
1203	B 6
1204	B 6
1205	A 6
1208	D 2
1209	B 1
1210	A 2
1214	I11
2200	A 8
2202	D 9
2203	D 9
2204	B 9
2206	C 8
2210	D 7
2211	D 8
2212	C 7
2213	B 9
2214	D 9
2215	G 2
2216	G 7
2217	H 8
2251	E 4
2298	G 5
2299	G 6
3201	C 1
3202	G 7
3203	H 8
3204	G 1
3239	D 5
3242	H 1
3255	D 4
5201	A 1
5211	E 1
6201	C 8
6202	A 8
6203	A 8
6204	B 8
6205	B 8
6206	H 6
6207	G 8
6208	H 7
6209	F 2
6210	F 2
6211	F 2
6212	F 2
6213	E 2
6214	G 1
6239	D 5
6242	G 1
6254	D 4
7201	F 6
7202	G 9
9292	C 2
9293	B 9
9294	B 3
9295	F 4

0014	E	3
0225	D	2
1008	A	3
1200	B	1
1201	C	5
1202	C	5
1203	C	2
1204	C	2
1205	C	5
1207	B	8
1208	B	1
1209	E	5
1210	A	5
1211	A	9
1214	D	1
1215	A	9
1218	B	8
1219	B	8
1222	A	9
1235	A	6
1299	E	2
1303	E	7
1304	E	1
1305	E	9
1360	D	6
1361	D	8
2200	E	5
2202	E	4
2204	C	1
2206	C	1
2210	D	2
2211	C	2
2212	D	2
2213	D	1
2214	D	4
2215	C	1
2216	D	4
2217	D	4
2221	A	6
2222	B	6
2225	B	6
2226	A	7
2227	C	6
2228	B	6
2236	A	7
2251	D	1
2253	A	9
2298	D	4
2299	D	4
2301	C	9
2302	C	7
2303	C	9
2304	C	8
2305	C	8
2306	C	7
2307	C	8
2308	C	6
2309	D	9
2310	D	7
2311	D	8
2312	D	7
2313	D	8
2314	D	6
2317	B	9
2319	C	9
2320	C	7
2323	C	7
2324	C	9
2325	B	9
2329	D	9
2341	C	9
2342	C	7
2345	E	8
2346	E	7
2374	B	9
3201	B	1
3202	C	4
3203	C	4
3204	E	2
3211	A	7
3215	B	6
3216	B	6
3217	B	6
3218	C	7
3219	B	6
3220	B	6
3221	B	7
3222	B	7
3223	A	6
3224	A	6
3225	B	7
3226	B	7
3227	B	7
3228	B	6
3229	B	6
3230	B	6
3235	A	6
3239	D	1
3241	A	8
3242	C	1
3243	A	8
3244	A	8
3246	A	8
3247	A	7
3248	A	8
3250	A	7
3251	A	9
3252	B	9
3253	A	9
3254	A	9
3255	E	1
3256	A	9
3301	C	9
3302	C	7
3303	C	9
3304	C	7
3305	C	9
3306	C	8
3307	B	9
3308	B	9
3309	B	9
3310	B	9
3311	D	9
3312	D	9
3313	D	7
3314	D	7
3316	D	8
3317	C	8
3321	A	9
3326	D	6
3327	C	9
3328	B	9
3333	B	9
3340	D	9
3341	C	9
3342	D	9
3343	C	9
3344	C	7
5201	D	5
5211	A	1
5301	D	9
5302	D	8
5303	D	7
5304	D	7
6201	D	2
6202	C	1
6203	D	1
6204	C	1
6205	D	1
6206	C	5
6207	C	4
6208	C	4
6209	C	1
6210	C	1
6211	B	1
6212	B	1
6213	C	1
6214	E	1
6221	A	6
6225	B	6
6226	A	7
6228	A	7
6233	B	6
6234	B	6
6235	A	8
6236	A	9
6239	D	2
6242	C	1
6243	B	9
6244	A	7
6245	A	7
6251	B	9
6252	A	9
6254	E	1
6300	B	8
6301	B	9
6305	D	8
6306	D	7
6307	D	8
6308	E	8
6309	D	9
6310	D	9
6312	C	8
6313	C	8
6314	C	9
6315	C	7
7201	D	4
7202	D	4
7211	A	7
7221	C	6
7222	B	7
7223	A	6
7224	B	7
7225	B	6
7226	C	6
7227	C	6
7228	B	6
7236	A	8
7237	A	7
7238	A	8
7251	A	9
7301	C	9
7302	C	7
7303	C	9
7304	D	9
7305	C	8
7315	D	9
7316	B	8
7322	B	9
8233	B	7
9281	E	8
9282	E	8
9283	E	8
9284	E	8
9285	E	8
9286	E	9
9287	E	9
9288	E	9
9289	E	9
9290	E	9
9291	A	5
9292	A	1
9293	D	1
9294	A	2
9295	E	1
9296	E	2
9297	E	2
9298	D	6
9299	D	5
9300	B	8
9301	A	4
9302	C	3
9303	A	9
9304	B	9
9305	C	8
9307	D	8
9308	D	9
9309	D	7
9310	C	1
9311	A	7
9313	B	8
9314	B	7
9315	D	3
9316	E	9
9317	D	8
9318	E	2
9320	D	2
9321	D	7
9322	B	9
9323	C	3
9324	D	8
9325	E	2
9328	B	7
9329	B	7
9330	D	8
9331	D	7
9335	A	8
9336	B	8
9338	B	8
9339	D	4
9340	B	8
9350	B	8
9353	B	4
9354	C	1
9361	B	7
9364	A	2
9365	A	2
9366	A	9
9367	A	8
9368	E	1
9397	A	7

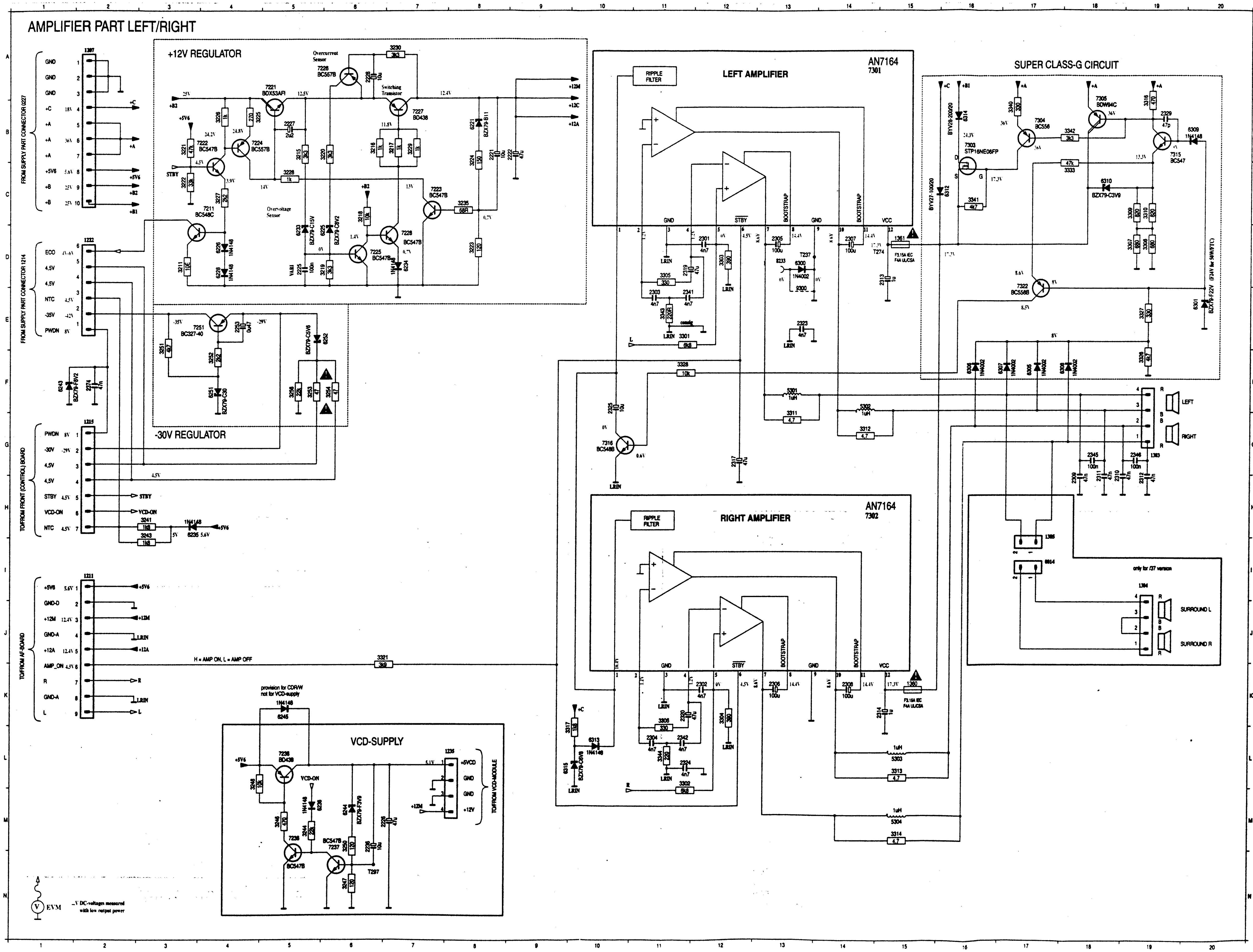


Componentside view

Supply Part

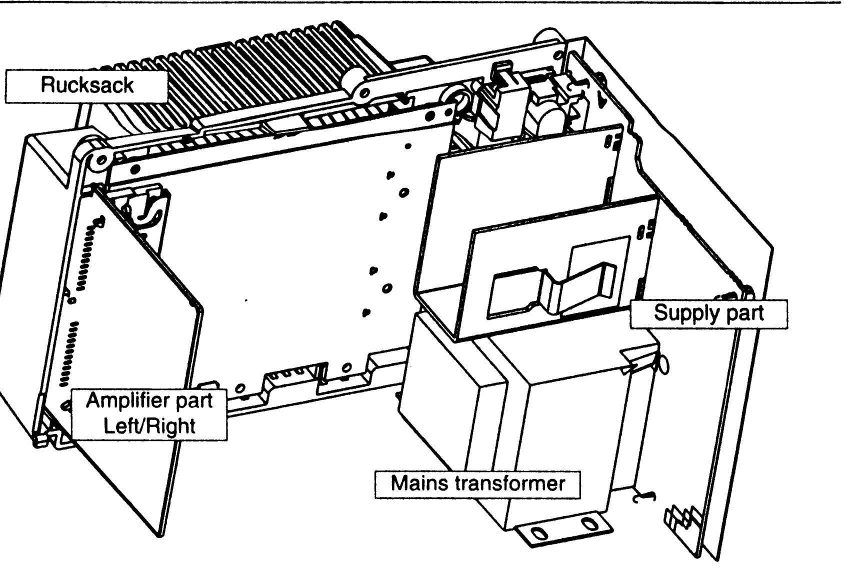
Amplifier Part Left/Right

P4-99 Componentside view stage 3 (19981214)


AMPLIFIER PART LEFT/RIGHT
+12V REGULATOR
-30V REGULATOR
LEFT AMPLIFIER
AN7164
7301
RIGHT AMPLIFIER
AN7164
7302
RIPPLE FILTER
SUPER CLASS-G CIRCUIT
VCD-SUPPLY
FROM SUPPLY PART CONNECTOR 0227
FROM SUPPLY PART CONNECTOR 1214
TO/FROM FRONT (CONTROL) BOARD
TO/FROM AF-BOARD
TO/FROM VCD-MODULE
Overcurrent Sensor
Switching Transistor
Overvoltage Sensor
H = AMP ON, L = AMP OFF
provision for CDR/W not for VCD-supply
only for /37 version
LEFT
RIGHT
SURROUND L
SURROUND R
F3.15A IEC F4A UL/CSA
EVM
V DC-voltages measured with low output power

0014 I17	9285 L1	
1207 A 2	9286 L1	
1211 I 2	9287 M	
1215 G 2	9288 M	
1218 M20	9289 M	
1219 M20	9290 N1	
1222 D 2	9300 E1	
1235 L 7		
1303 G19		
1304 I19		
1305 I17		
1360 K15		
1361 D15		
2221 B 8		
2222 B 9		
2225 D 5		
2226 M 7		
2227 B 5		
2228 A 6		
2236 M 6		
2253 E 4		
2301 D12		
2302 K12		
2303 E11		
2304 L11		
2305 D13		
2306 K13		
2307 D14		
2308 K14		
2309 H18		
2310 H18		
2311 H18		
2312 H19		
2313 D15		
2314 K15		
2317 G12		
2319 D11		
2320 K11		
2323 E13		
2324 L11		
2325 F10		
2329 B19		
2341 E11		
2342 L11		
2345 G18		
2346 G19		
2374 F 2		
3211 D 3		
3215 B 5		
3216 B 6		
3217 B 7		
3218 C 6		
3219 D 6		
3220 B 6		
3221 B 3		
3222 C 3		
3223 D 8		
3224 B 8		
3225 B 4		
3226 B 4		
3227 C 4		
3228 C 5		
3229 B 7		
3230 A 7		
3235 C 8		
3241 H 3		
3243 H 3		
3244 M 5		
3246 M 5		
3247 N 6		
3248 L 4		
3250 M 6		
3251 E 3		
3252 F 4		
3253 F 5		
3254 F 6		
3256 F 5		
3301 E11		
3302 L11		
3303 D12		
3304 K12		
3305 D11		
3306 K11		
3307 D19		
3308 D19		
3309 C19		
3310 C19		
3311 G13		
3312 G14		
3313 L15		
3314 M15		
3316 B19		
3317 L10		
3321 J 6		
3326 F19		
3327 E19		
3328 F11		
3333 C18		
3340 B17		
3341 C16		
3342 B18		
3343 E11		
3344 L11		
5301 F13		
5302 F14		
5303 L15		
5304 M15		
6221 B 8		
6225 D 6		
6226 D 4		
6228 D 4		
6233 D 5		
6234 D 7		
6235 H 3		
6236 M 5		
6243 F 1		
6244 M 6		
6245 K 5		
6251 F 4		
6252 E 5		
6300 D13		
6301 E20		
6305 F17		
6306 F16		
6307 F17		
6308 F18		
6309 B20		
6310 C18		
6312 C16		
6313 L10		
6314 B16		
6315 L 9		
7211 C 4		
7221 A 5		
7222 B 3		
7223 C 7		
7224 B 4		
7225 D 6		
7226 A 5		
7227 B 7		
7228 D 7		
7236 M 5		
7237 M 6		
7238 L 5		
7251 E 3		
7301 A15		
7302 H15		
7303 B16		
7304 B17		
7305 B18		
7315 B19		
7316 G10		
7322 E17		
8233 D13		
9281 K17		
9282 K17		
9283 L17		
9284 L17		

PARTSLIST POWER4 MODULE



MECHANICAL PARTSLIST POWER4 MODULE

4822 426 10607	RUCKSACK for /37 only
4822 426 10608	RUCKSACK not fo /37
4822 492 11735	SPRING TRANSISTOR
4822 492 11068	CLIP RECTIFIER
4822 255 40179	SPRING CLIP TO220

ELECTRICAL PARTSLIST POWER4 MODULE

MISCELLANEOUS

1200	4822 071 51002	FUSE T1A
1201	4822 071 51002	FUSE T1A
1201	4822 253 50137	FUSE T 2,5A UL
1202	4822 252 11224	FUSE T1A
1203	4822 071 52502	FUSE T 2,5A
1203	4822 252 51121	FUSE T3,15A UL
1204	4822 071 52502	FUSE T 2,5A
1204	4822 252 51121	FUSE T3,15A UL
1205	4822 071 52502	FUSE T 2,5A
1205	4822 252 51121	FUSE T3,15A UL
1209	4822 265 31015	MAINS SOCKET, IEC
1209	4822 265 31016	MAINS SOCKET, UL
1210	4822 272 10269	VOLTAGE SELECTOR
1299	4822 071 51002	FUSE T1A
1303	4822 267 31176	SPEAKER TERMINAL
1360	4822 252 11225	FUSE F3.15A IEC 250V
1360	4822 252 11226	FUSE F4A UL/CSA 250V
1361	4822 252 11225	FUSE F3.15A IEC 250V
1361	4822 252 11226	FUSE F4A UL/CSA 250V

CAPACITORS

2200	4822 124 80103	4700µF	20%	25V
2202	4822 124 80415	4700µF	20%	50V
2204	4822 124 42367	3300µF	20%	35V
2206	5322 121 42386	100nF	5%	63V
2210	5322 121 42386	100nF	5%	63V
2211	5322 121 42386	100nF	5%	63V
2212	5322 121 42386	100nF	5%	63V
2216	4822 126 12882	100nF	20%	50V
2217	4822 126 12882	100nF	20%	50V
2221	4822 124 41579	10µF	20%	50V

CAPACITORS

2222	4822 124 40433	47µF	20%	25V
2226	4822 124 40433	47µF	20%	25V
2227	4822 124 41576	2,2µF	20%	50V
2228	4822 124 41579	10µF	20%	50V
2236	4822 124 41579	10µF	20%	50V
2251	4822 124 40255	100µF	20%	50V
2253	4822 124 41407	0,47µF	20%	63V
2301	4822 126 11714	4,7nF	20%	16V
2302	4822 126 11714	4,7nF	20%	16V
2303	4822 126 11714	4,7nF	20%	16V
2304	4822 126 11714	4,7nF	20%	16V
2305	4822 124 81029	100µF	20%	25V
2306	4822 124 81029	100µF	20%	25V
2307	4822 124 81029	100µF	20%	25V
2308	4822 124 81029	100µF	20%	25V
2309	4822 121 43526	47nF	5%	100V
2310	4822 121 43526	47nF	5%	100V
2311	4822 121 43526	47nF	5%	100V
2312	4822 121 43526	47nF	5%	100V
2313	4822 124 40242	1µF	20%	63V
2314	4822 124 40242	1µF	20%	63V
2317	4822 124 40433	47µF	20%	25V
2319	4822 124 40433	47µF	20%	25V
2320	4822 124 40433	47µF	20%	25V
2323	4822 126 11714	4,7nF	20%	16V
2324	4822 126 11714	4,7nF	20%	16V
2325	4822 124 41579	10µF	20%	50V
2329	4822 122 33848	47pF	5%	50V
2341	4822 126 11714	4,7nF	20%	16V
2342	4822 126 11714	4,7nF	20%	16V

ELECTRICAL PARTSLIST POWER4 MODULE

CAPACITORS

2345	4822 126 12882	100nF	20%	50V
2346	4822 126 12882	100nF	20%	50V
2374	4822 121 43526	47nF	5%	100V

RESISTORS

3201	4822 053 21106	10MΩ	5%	0,5W
3202	4822 116 83864	10kΩ	5%	0,5W
3203	4822 116 83876	270Ω	5%	0.16W
3204	4822 052 10338	3,3Ω		NFR25
3215	4822 116 52269	3,3kΩ	5%	0,5W
3216	4822 050 11002	1kΩ	5%	0,2W
3217	4822 050 11002	1kΩ	5%	0,2W
3218	4822 116 83864	10kΩ	5%	0,5W
3219	4822 116 52269	3,3kΩ	5%	0,5W
3220	4822 116 52269	3,3kΩ	5%	0,5W
3221	4822 116 83884	47kΩ	5%	0,16W
3222	4822 116 52271	33kΩ	5%	0,16W
3223	4822 116 52206	120Ω	5%	0,5W
3224	4822 116 83868	150Ω	5%	0,5W
3225	4822 116 83876	270Ω	5%	0.16W
3226	4822 050 11002	1kΩ	5%	0,2W
3227	4822 116 52256	2,2kΩ	5%	0,16W
3228	4822 050 11002	1kΩ	5%	0,2W
3229	4822 050 11002	1kΩ	5%	0,2W
3230	4822 116 52269	3,3kΩ	5%	0,5W
3235	4822 116 52199	68Ω	5%	0,16W
3239	4822 116 52283	4,7kΩ	5%	0,5W
3241	4822 116 52249	1,8kΩ	5%	0,16W
3243	4822 116 52228	680Ω	5%	0,5W
3244	4822 116 52257	22kΩ	5%	0,5W
3246	4822 116 83883	470Ω	5%	0,16W
3247	4822 116 52206	120Ω	5%	0,5W
3248	4822 116 83864	10kΩ	5%	0,5W
3250	4822 116 52206	120Ω	5%	0,5W
3251	4822 116 52283	4,7kΩ	5%	0,5W
3252	4822 116 52256	2,2kΩ	5%	0,16W
3253	4822 052 10479	47Ω	5%	0,3W
3254	4822 052 10479	47Ω	5%	0,3W
3255	4822 117 12148	1,5Ω	5%	
3256	4822 116 52257	22kΩ	5%	0,5W
3301	4822 116 83961	6,8kΩ	5%	0,16W
3302	4822 116 83961	6,8kΩ	5%	0,16W
3303	4822 116 83881	390Ω	5%	0,5W
3304	4822 116 83881	390Ω	5%	0,5W
3305	4822 116 52219	330Ω	5%	0,5W
3306	4822 116 52219	330Ω	5%	0,5W
3307	4822 116 52228	680Ω	5%	0,5W
3308	4822 116 52228	680Ω	5%	0,5W
3309	4822 116 52231	820Ω	5%	0,5W
3310	4822 116 52231	820Ω	5%	0,5W
3311	4822 050 24708	4,7Ω	1%	0,6W
3312	4822 050 24708	4,7Ω	1%	0,6W
3313	4822 050 24708	4,7Ω	1%	0,6W
3314	4822 050 24708	4,7Ω	1%	0,6W
3316	4822 116 83883	470Ω	5%	0,16W
3317	4822 116 52249	1,8kΩ	5%	0,16W
3321	4822 116 52276	3,9kΩ	5%	0,5W
3326	4822 116 52283	4,7kΩ	5%	0,5W
3327	4822 116 52219	330Ω	5%	0,5W
3328	4822 116 83864	10kΩ	5%	0,5W
3333	4822 116 83884	47kΩ	5%	0,16W
3340	4822 116 52219	330Ω	5%	0,5W
3341	4822 116 52283	4,7kΩ	5%	0,5W
3342	4822 116 52269	3,3kΩ	5%	0,5W
3343	4822 116 83872	220Ω	5%	0,5W
3344	4822 116 83872	220Ω	5%	0,5W

COILS

5201	4822 157 11832	MAINS FILTER
5301	4822 157 62255	COIL 18.5 TURNS
5302	4822 157 62255	COIL 18,5 TURNS
5303	4822 157 62255	COIL 18.5 TURNS
5304	4822 157 62255	COIL 18,5 TURNS

DIODES

6201	4822 130 82078	D5SBA20
6204	5322 130 80686	1N5392
6205	5322 130 80686	1N5392
6206	4822 130 30621	1N4148
6207	4822 130 34278	BZX79-C6V8
6208	4822 130 31878	1N4003G
6221	4822 130 34488	BZX79-C11
6225	4822 130 34382	BZX79-C8V2
6226	4822 130 30621	1N4148
6228	4822 130 30621	1N4148
6233	4822 130 34281	BZX79-C15
6234	4822 130 30621	1N4148
6235	4822 130 30621	1N4148
6239	4822 130 30621	1N4148
6243	4822 130 34382	BZX79-C8V2
6244	4822 130 31981	BZX79-C3V9
6251	4822 130 34328	BZX79-C30
6252	4822 130 34173	BZX79-B5V6
6254	4822 130 31878	1N4003G
6300	4822 130 31878	1N4003G
6301	4822 130 34441	BZX79-F22
6305	4822 130 31878	1N4003G
6306	4822 130 31878	1N4003G
6307	4822 130 31878	1N4003G
6308	4822 130 31878	1N4003G
6309	4822 130 30621	1N4148
6310	4822 130 31981	BZX79-C3V9
6312	4822 130 31982	BYV27-100
6313	4822 130 30621	1N4148
6314	4822 130 80791	BYV28-200/20
6315	4822 130 34278	BZX79-C6V8

TRANSISTORS

7202	5322 130 44647	BC368
7221	4822 130 10812	BDX53BFI
7222	4822 130 40959	BC547B
7223	4822 130 40959	BC547B
7224	4822 130 41691	BC556B
7225	4822 130 40959	BC547B
7226	4822 130 41691	BC556B
7227	4822 130 40995	BD438
7228	4822 130 40959	BC547B
7236	4822 130 40959	BC547B
7237	4822 130 40959	BC547B
7238	4822 130 40995	BD438
7251	4822 130 41327	BC327-40
7303	4822 130 11336	STP16NE06FP
7304	4822 130 41691	BC556B
7305	4822 130 10847	BDW94C
7315	4822 130 40959	BC547B
7316	4822 130 40959	BC547B
7322	4822 130 44568	BC557B

INTEGRATED CIRCUITS

7201	4822 209 80817	L7805CV
7301	4822 209 90411	AN7164
7302	4822 209 90411	AN7164

AF6 BOARD

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BRIEF INTRODUCTION OF THE AF6 BOARD

The AF6 Board consists of the following features :

a. SOFAC IC

SOFAC IC TEA6321 (7511) which includes functions such as source selection, loudness control, dynamic bass control, treble control, front/rear volume control and muting function. Sound features such as DBB, DSC and IS are controllable via I²C Bus from the microprocessor.

The SOFAC IC caters for 4 input sources, namely tuner, tape, CD and AUX.
It also has a MONO input which is tied to ground via a capacitor. In our application, software will switch the input source to previous source MUTE during STANDBY mode and some other occasions where noise from other input source is undesirable.
Note that the input to the SOFAC IC must be ac coupled to prevent 'plop' noise.
Input networks are included to provide appropriate attenuation for various sources.

b. KARAOKE MIC. MIXING

The AF6 Board has provisions which can be configured to cater for one of the following:
NK : Non-Karaoke.
SK : Simple Karaoke which caters for single mic. mixing with additional mic. amplifier board.
FK : Full Karaoke which caters for double mic. mixing with additional mic. amplifier board.

c. DOLBY PRO LOGIC (DPL) INTERFACE

The AF6 Board has provisions which can be configured to cater for Dolby Pro Logic (DPL).

d. LINE OUT

Line out with cinch socket for connection to external amplifier.

e. SUB-WOOFER OUT

Sub-woofer out with cinch socket for connection to active sub-woofer speaker.

f. INCREDIBLE SURROUND

Incredible surround effect using transistor circuit (7531, 7532, 7533, 7534) to create phase shifting and spatial effect.

g. HEADPHONE AMPLIFIER

Headphone Amplifier to drive 32 ohm to 1kohm headphone.

h. CD STANDBY CONTROL

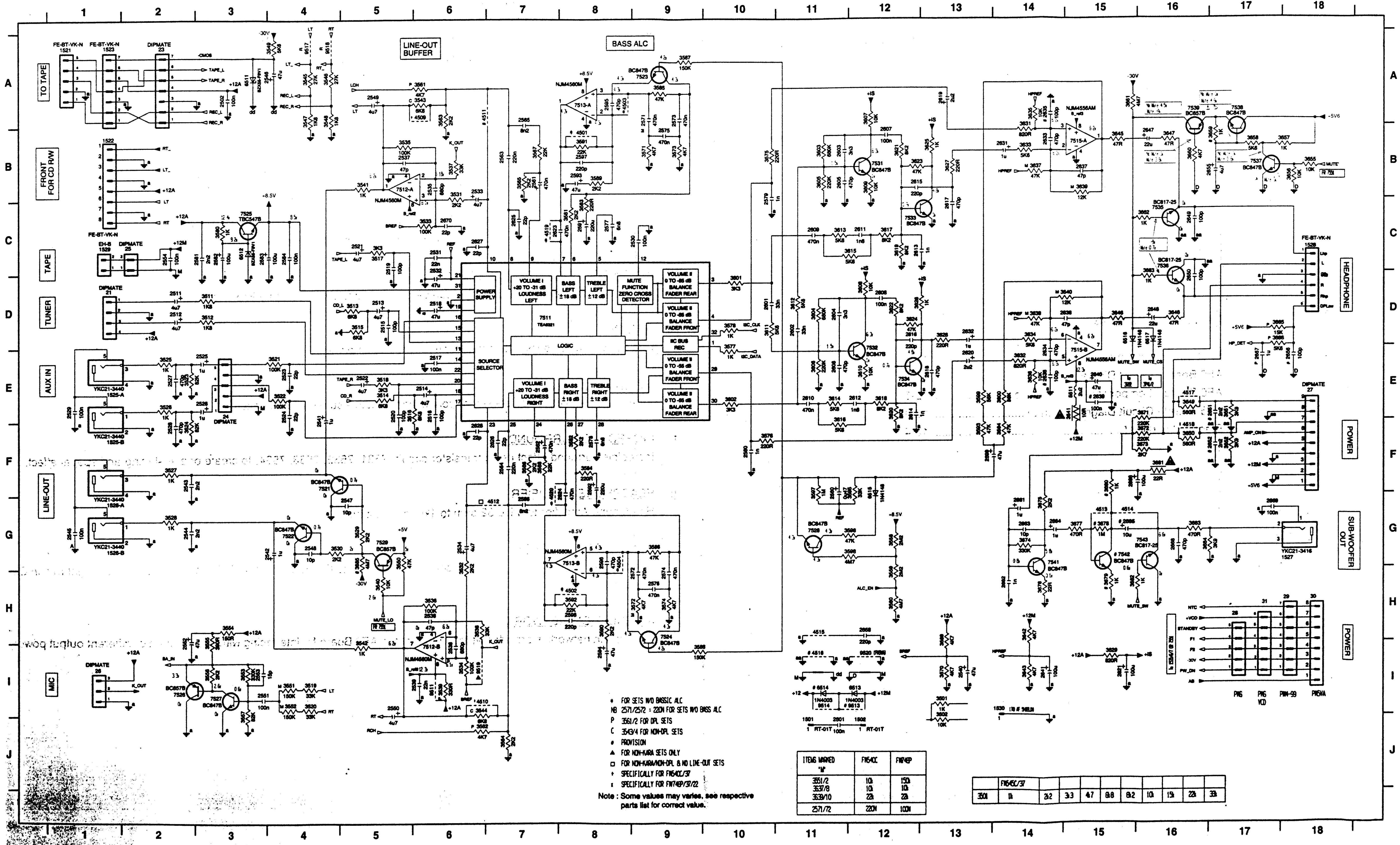
CD Standby Control circuit which switches on the supply to CD servo control IC, HF circuit and the laser light pen in CD mode only.

i. ATTENUATION NETWORK

Attenuation network is provided at the output of the AF6 Board for interfacing with power board of different output power.

AF6 BOARD - CIRCUIT DIAGRAM (PART 1)

21 D1
23 A2
24 E3
25 C2
26 I1
27 E18
28 H17
29 H18
30 H18
31 H17
1501 J11
1502 J12
1521 A1
1522 B1
1523 A1
1525-A E2
1525-B F2
1526-A G2
1526-B G2
1527 G18
1528 C18
1529 C1
1530 I14
2501 J11
2502 A3
2511 D2
2512 D2
2513 D6
2514 E6
2515 D6
2516 E6
2517 E6
2518 D6
2519 C5
2520 E5
2521 C5
2522 E5
2523 E4
2524 E4
2525 E3
2526 E3
2527 E2
2528 F2
2529 E1
2530 C9
2531 C6
2532 C6
2533 B6
2534 G6
2535 B6
2536 I6
2537 B5
2538 H6
2539 I6
2540 I13
2541 E4
2542 G4
2543 F2
2544 G2
2545 G1
2546 A4
2547 G5
2548 G4
2549 A5
2550 I5
2551 I3
2552 H2
2553 I3
2554 C2
2560 F11
2561 B7
2562 F7
2563 B7
2564 F7
2565 A7
2566 G7
2571 A9
2572 H9
2573 A9
2574 H9
2575 B9
2576 H9
2577 C8
2578 F8
2579 B10
2580 F10
2581 C3
2582 C3
2583 C3
2584 C4
2591 C8
2592 F8
2593 B8
2594 I8
2595 A8
2596 G8
2597 B8
2598 H8
2599 F13
2601 D10
2602 D11
2603 B11
2604 D11
2605 B11
2606 E11
2607 B12
2608 D12
2609 C11
2610 E11
2611 C12
2612 E12
2613 C12
2614 E12
2615 B12
2616 D12
2617 C13
2618 E13
2619 A13
2620 E13
2621 I15
2623 C7
2624 F8
2625 C7
2626 F7
2627 C6
2628 F6
2631 B14
2632 D13
2633 B14
2634 E14
2635 A14
2636 E14
2637 B15
2638 D15
2639 E15
2640 E15
2641 I14
2647 B16
2648 D16
2649 C16
2650 D16
2651 E17
2652 F17
2655 B17
2656 E18
2657 E17
2658 H12
2661 G14
2662 H14
2663 G14
2664 G14
2665 G15
2666 F16
2668 G16
2669 G17
2670 C6
3501 I13
3502 J13
3511 D3
3512 D3
3513 D6
3514 E5
3515 D6
3516 E5
3517 C5
3518 E5
3519 I4
3520 I4
3521 E4
3522 E4
3523 E2
3524 F2
3525 E2
3526 E2
3527 F2
3528 G2
3529 G5
3530 G4
3531 B6
3532 G6
3533 C6
3534 I6
3535 B5
3536 H6
3537 B6
3538 H6
3539 I6
3540 H5
3541 B5
3542 I5
3543 A6
3544 I6
3545 A4
3546 A4
3547 A4
3548 A4
3549 A4
3550 G5
3551 I4
3552 I4
3553 I3
3554 H3
3555 H3
3556 I3
3557 I3
3558 G12
3559 H12
3560 H12
3561 A6
3562 J6
3563 A6
3564 J7
3565 B7
3566 F7
3567 B7
3568 F7
3569 H13
3570 I13
3571 B9
3572 H9
3573 B9
3574 H9
3575 B10
3576 F10
3577 E10
3578 D10
3580 C3
3581 C8
3582 F8
3583 C8
3584 F8
3585 A9
3586 G9
3587 A9
3588 I9
3589 B8
3590 H8
3591 B8
3592 H8
3593 F13
3594 F14
3595 F12
3596 G12
3597 F11
3598 G12
3599 E13
3600 E14
3601 D10
3602 E10
3603 B11
3604 D11
3605 B11
3606 E11
3607 A12
3608 D12
3609 B12
3610 E12
3611 D10
3612 D11
3613 C11
3614 E11
3615 C12
3616 F11
3617 C12
3618 E12
3619 C12
3620 E12
3621 B12
3622 D12
3623 B12
3624 D12
3625 B13
3626 D12
3627 B13
3628 D13
3629 I15
3631 B14
3632 E14
3633 B14
3634 D14
3635 A14
3636 E14
3637 B14
3638 D14
3639 B15
3640 D15
3641 E15
3642 H14
3643 I14
3645 B15
3646 D15
3647 B16
3648 D16
3649 E16
3650 F16
3651 E17
3652 F17
3655 B18
3656 B18
3657 B18
3658 B17
3659 B17
3660 B16
3661 A15
3662 C16
3663 D16
3665 D17
3666 D17
3671 E16
3672 F16
3673 F16
3674 G14
3675 G14
3676 H14
3677 G15
3678 G15
3679 H15
3680 F15
3681 F16
3682 H15
3683 G16
3684 G16
3685 G5
4501 B8
4502 H8
4503 A8
4504 G8
4509 A5
4510 I6
4511 A6
4512 G7
4513 G15
4514 G15
4515 H11
4516 I11
4517 E16
4518 F16
4519 C7
4520 F7
5511 E15
6511 A3
6512 C3
6513 I12
6514 I11
6515 F12
6516 D15
6517 D16
7511 D7
7512-A B5
7512-B I6
7513-A A8
7513-B G8
7515-A B15
7515-B E15
7521 F4
7522 G4
7523 A9
7524 H9
7525 C3
7526 I2
7527 I3
7528 G11
7529 G5
7531 B12
7532 E12
7533 C12
7534 E12
7535 C16
7536 C16
7537 B17
7538 A17
7539 A16
7541 G14
7542 G15
7543 G16
9511 I6
9513 I12
9514 I11
9517 A4
9518 A4
9519 I6
9520 I12



TO TAPE
FRONT FOR CD R/W
TAPE
TUNER
AUX IN
LINE-OUT
MIC
LINE-OUT BUFFER
BASS ALC
POWER SUPPLY
SOURCE SELECTOR
VOLUME I +20 TO -31 dB LOUDNESS LEFT
BASS LEFT ±18 dB
TREBLE LEFT ±12 dB
MUTE FUNCTION ZERO CROSS DETECTOR
VOLUME II 0 TO -65 dB BALANCE FADER REAR
VOLUME II 0 TO -65 dB BALANCE FADER FRONT
LOGIC
IIC BUS REC
VOLUME I +20 TO -31 dB LOUDNESS RIGHT
BASS RIGHT ±18 dB
TREBLE RIGHT ±12 dB
7511 TEA6821
NJM4560M
NJM4556AM
HEADPHONE
POWER
SUB-WOOFER OUT
FE-BT-VK-N
DIPMATE
YKC21-3440
YKC21-3416
BC847B
BC857B
BC817-25
1N4003
1N4148
+12A
+12M
+8.5V
+5V6
-30V
A B C D E F G H I J
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

# FOR SETS W/O BASSIC ALC
NB 2571/2572 : 220N FOR SETS W/O BASS ALC
P 3561/2 FOR DPL SETS
C 3543/4 FOR NON-DPL SETS
● PROVISION
▲ FOR NON-KARA SETS ONLY
□ FOR NON-KARA/NON-DPL & NO LINE-OUT SETS
† SPECIFICALLY FOR FW640C/37
‡ SPECIFICALLY FOR FW748P/37/22

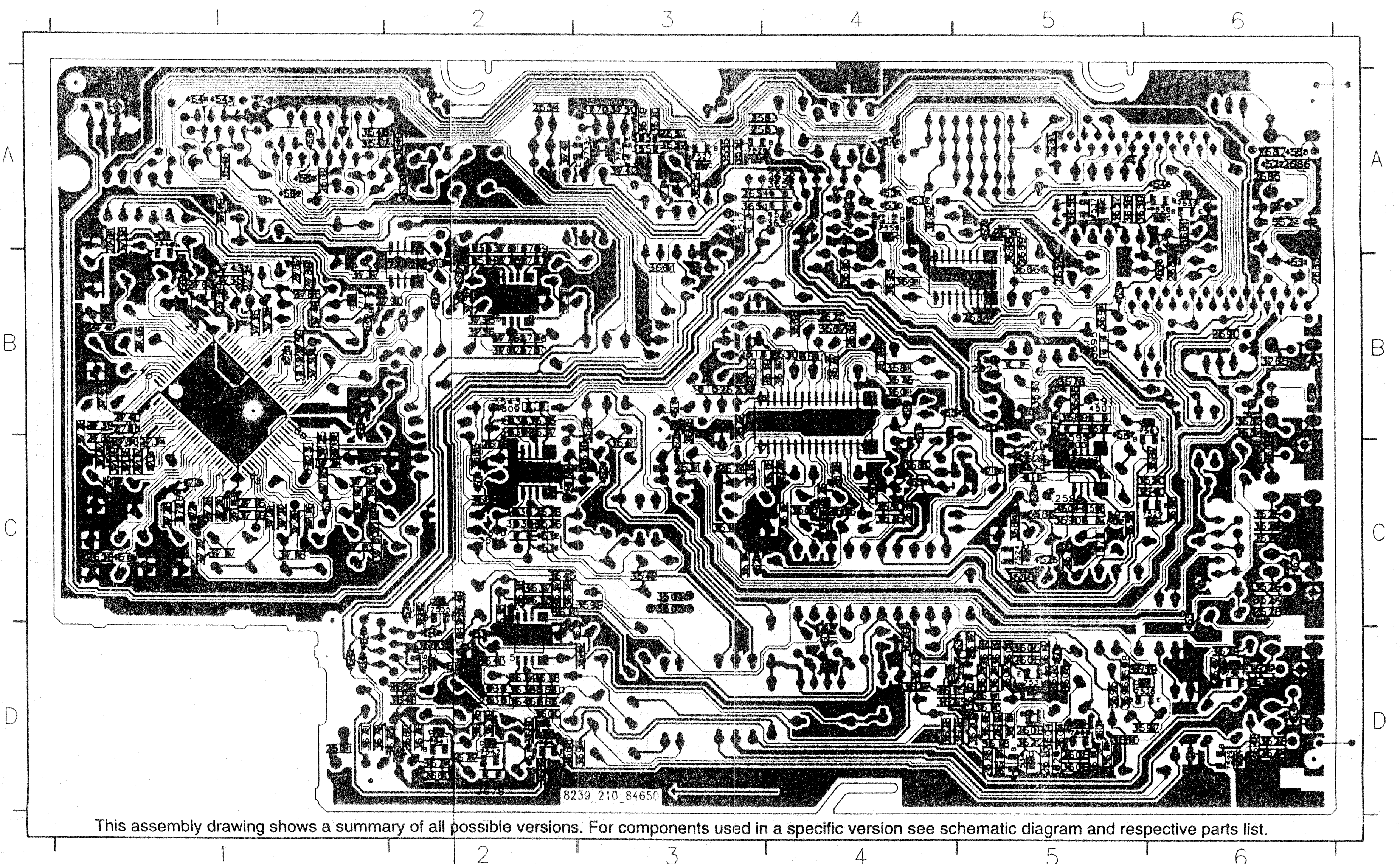
Note : Some values may varies, see respective parts list for correct value.

ITEMS MARKED "M"	FW640C	FW748P
3551/2 3637/8 3639/10	10k 10k 22k	150k 10k 22k
2571/72	220N	100N

	FW645C/37									
3501	1k	2k2	3k3	4k7	6k8	8k2	10k	15k	22k	33k

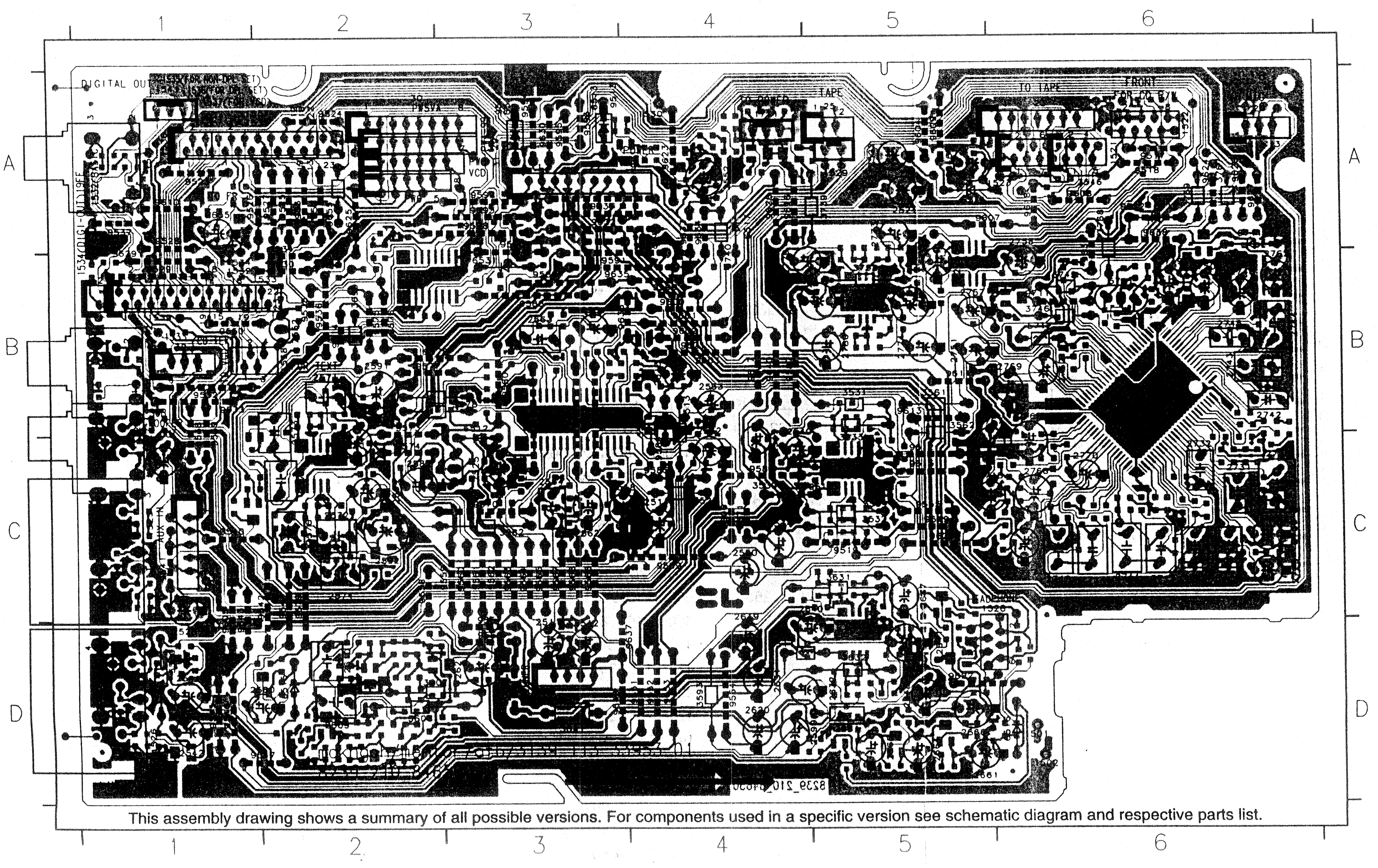
AF6 BOARD - CHIP LAYOUT

2501 D1	2543 D6	2598 C5	2625 B4	2663 D2	2723 C1	2763 B1	3515 B3	3542 C3	3564 C2	3587 C6	3609 D5	3628 D4	3652 A4	3679 D2	3719 C1	3742 A3	4503 C5	4528 C3	4547 B5	4580 C5	7527 A3	7713 A3
2502 A1	2544 D6	2601 D5	2626 C4	2668 D2	2724 C1	2764 B1	3516 C3	3543 B2	3565 B4	3588 C5	3610 D5	3629 D4	3656 A5	3680 D2	3720 C1	3743 B1	4504 C5	4529 C3	4548 D2	4611 B5	7528 D5	7714 A3
2515 B3	2545 D6	2602 D5	2627 B3	2669 C6	2725 C1	2768 C1	3517 B4	3544 C2	3566 C4	3589 B5	3611 D5	3633 C2	3657 A5	3682 D2	3721 C1	3748 B1	4509 B2	4530 A4	4549 B1	4664 B1	7529 C6	7715 A1
2516 C3	2547 D6	2603 D5	2628 B3	2670 C2	2726 C1	2775 B2	3518 C4	3545 A1	3567 B4	3590 C5	3612 D5	3634 D2	3658 A5	3683 B6	3722 C1	3749 A1	4510 C2	4531 A4	4551 B6	4710 B2	7531 D5	7716 B1
2517 B3	2548 D6	2604 D5	2633 C2	2681 B5	2733 C1	2776 B2	3519 A3	3547 A1	3568 C4	3591 B5	3613 D5	3635 C2	3659 A5	3684 B6	3723 C1	3750 A3	4511 B3	4532 A4	4553 C4	4711 A3	7532 D5	7717 B2
2519 B4	2551 A3	2605 D5	2634 D2	2682 B6	2734 C1	2777 B2	3520 A3	3548 A1	3569 B3	3592 C5	3614 D5	3636 D2	3660 A6	3685 C6	3724 C1	3751 B2	4512 C2	4533 A2	4554 D5	4714 C5	7533 D5	
2520 C4	2553 A4	2606 D5	2635 C2	2683 B6	2737 C1	2778 B2	3523 C6	3549 A2	3570 C3	3594 D3	3615 D5	3637 C2	3661 B3	3691 B4	3725 C1	3753 B2	4513 D2	4534 C2	4556 C6	4715 B4	7534 D5	
2523 B3	2554 A2	2607 D5	2636 D2	2685 A6	2738 B1	2781 A5	3524 C6	3550 C6	3571 B5	3595 D5	3616 D5	3638 D2	3662 C2	3692 A4	3726 C1	3755 A2	4514 D2	4535 B2	4557 B4	4716 C5	7535 C2	
2524 C3	2565 B4	2608 D5	2637 C2	2686 A6	2739 B1	2785 C1	3525 C6	3551 A3	3572 C5	3596 D5	3617 D5	3639 C2	3663 D2	3693 B4	3727 C1	3756 B2	4515 C1	4536 C1	4558 B6	5524 A6	7536 D2	
2527 C6	2566 C4	2611 D5	2638 D2	2687 A6	2740 B1	2786 C1	3526 C6	3552 A3	3573 B5	3597 D5	3618 D5	3640 D2	3665 B4	3694 B5	3728 B1	3757 B2	4516 D2	4537 C1	4559 B5	5713 C1	7537 A5	
2528 C6	2577 B4	2612 D5	2639 D2	2688 A5	2741 B1	2787 B1	3527 D6	3553 A4	3574 C5	3598 D5	3619 D5	3642 D3	3666 B5	3695 B5	3729 C1	3758 B2	4517 A3	4538 D4	4561 A1	7511 B4	7538 A6	
2529 C6	2578 C4	2613 D5	2649 C2	2689 A5	2746 B1	2788 B1	3528 D6	3554 A3	3575 B4	3599 C3	3620 D5	3643 D2	3671 D1	3711 C1	3732 B1	3759 A2	4518 A4	4539 D2	4562 A1	7512 C2	7539 A6	
2530 B4	2579 B4	2614 D5	2650 D2	2690 B6	2747 B1	2789 B1	3529 D6	3555 A3	3576 C4	3600 D2	3621 D5	3645 C2	3672 D1	3712 C1	3733 B1	3760 B2	4519 B5	4540 D1	4563 A1	7513 C5	7541 D2	
2531 C3	2580 C4	2615 D4	2651 A3	2715 C1	2753 B1	2790 B2	3535 B2	3556 A3	3580 C4	3601 B4	3622 D5	3646 D2	3673 D2	3713 C1	3734 B1	3761 A2	4520 C5	4541 D1	4565 B1	7515 D2	7542 D2	
2535 B2	2581 C4	2616 D5	2652 A4	2716 C1	2754 B1	3501 C3	3536 C2	3557 A3	3581 B4	3602 C4	3623 D4	3647 D2	3674 D2	3714 C1	3735 B1	3762 B2	4522 A6	4542 D1	4566 B2	7521 D6	7543 D2	
2536 C2	2584 B4	2617 D5	2656 A5	2719 C1	2755 B1	3502 C3	3537 B2	3558 C5	3583 B5	3603 D5	3624 D5	3648 D2	3675 D2	3715 C1	3736 C1	3765 B6	4523 A5	4543 A1	4567 B2	7522 D6	7551 B5	
2537 B2	2595 B5	2618 D5	2657 B5	2720 C1	2759 B1	3511 B4	3538 C2	3559 D5	3584 C5	3604 D5	3625 D4	3649 A3	3676 D2	3716 C1	3737 B1	3770 A3	4524 B5	4544 A1	4568 A6	7523 B6	7553 A4	
2538 C2	2596 C5	2623 B5	2658 C1	2721 C1	2760 B6	3512 C4	3540 C6	3560 D5	3585 B5	3605 D5	3626 D5	3650 A4	3677 D2	3717 C1	3738 A1	4501 B5	4525 C5	4545 A4	4571 C2	7524 C5	7711 B1	
2539 C2	2597 B5	2624 C5	2662 D2	2722 C1	2761 A1	3514 C3	3541 C3	3563 C2	3586 C5	3606 D5	3627 D4	3651 A3	3678 D2	3718 C1	3741 A2	4502 C5	4527 C3	4546 A6	4573 C2	7526 A3	7712 B2	



This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

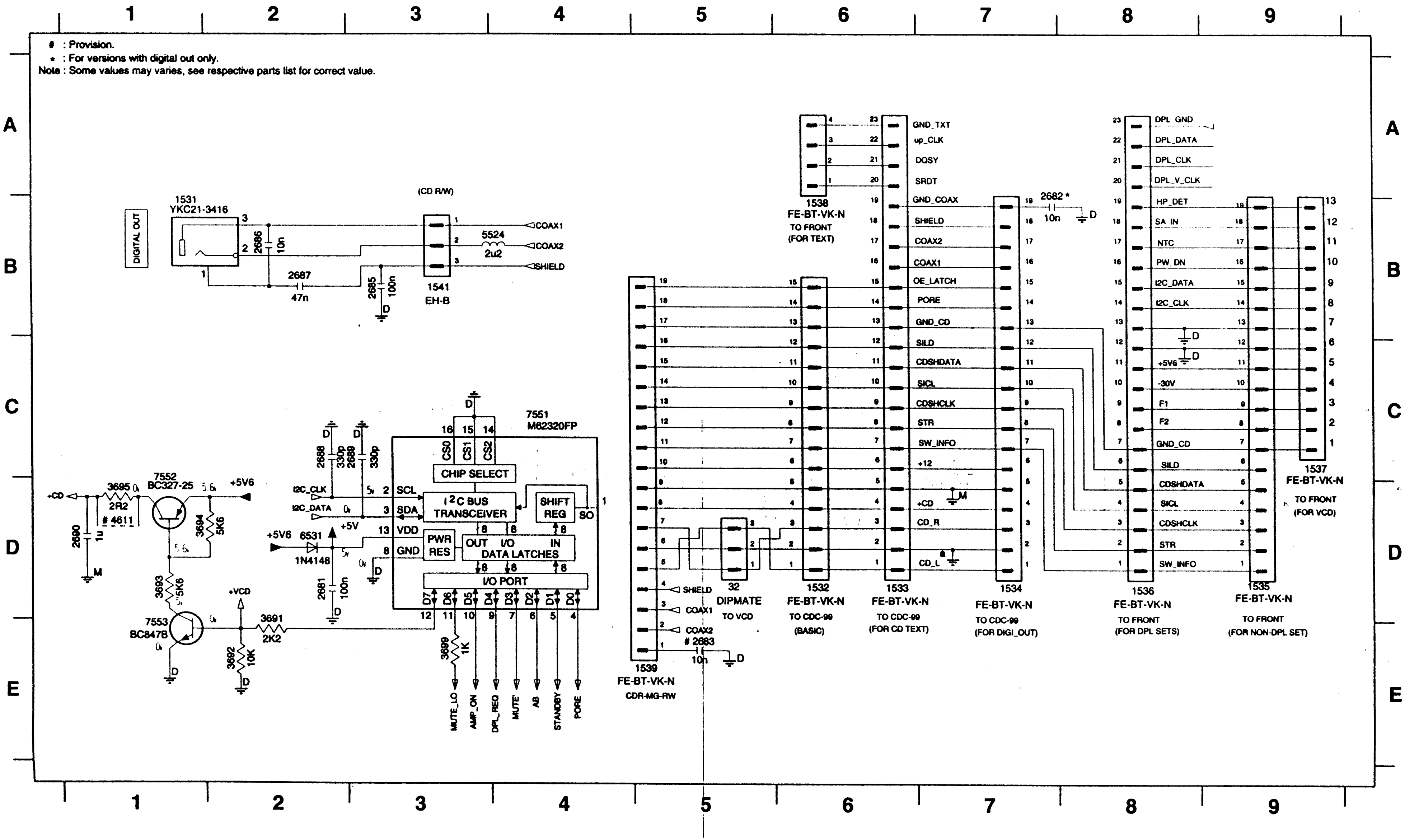
21 D3	1521 A6	1535 A2	2521 A5	2552 A4	2583 C3	2640 C5	2717 C6	2748 B6	2770 C6	3533 C5	3632 D5	5511 D4	7525 C3	9526 A1	9539 B1	9552 D4	9565 C3	9579 C2	9592 A3	9605 C1	9618 A6	9631 A3
23 A6	1522 A6	1536 A1	2522 A5	2560 D2	2591 B2	2641 D5	2718 C5	2749 B6	2771 B4	3534 C5	3641 D3	5711 B6	7552 B2	9527 A2	9540 C1	9553 D4	9566 C3	9580 B3	9593 A3	9606 C4	9619 C5	9632 A3
24 C1	1523 A6	1537 A2	2525 C1	2561 B3	2592 C2	2647 C5	2727 C6	2750 B6	2772 B5	3539 C4	3655 A2	5712 B6	9511 C5	9528 A1	9541 C1	9554 D4	9567 C3	9581 B3	9594 A3	9607 A5	9620 C5	9633 A4
25 A5	1525 C1	1538 B2	2526 D1	2562 C3	2593 C2	2648 D5	2728 C6	2751 B5	2773 A5	3546 A6	3681 D5	6511 A5	9513 A3	9529 B1	9542 C2	9555 C5	9568 C3	9582 B3	9595 A3	9608 A6	9621 B4	9634 A4
26 A6	1526 D1	1539 B1	2532 B4	2563 B3	2594 C2	2655 A1	2729 C6	2752 B6	2774 B5	3561 B5	3699 B2	6512 B3	9514 A3	9530 B2	9543 C1	9556 D3	9569 C4	9583 B3	9596 A3	9609 A5	9622 D5	9635 B3
27 A3	1527 C1	1541 A1	2533 B4	2564 C3	2599 D5	2661 D5	2730 C6	2756 B5	2779 B4	3562 B5	3739 A5	6513 A3	9517 A6	9531 A2	9544 C2	9557 C3	9570 C3	9584 C4	9597 A4	9610 A1	9623 A4	9636 B3
28 A3	1528 C5	1711 A4	2534 C4	2571 B2	2609 D2	2664 D5	2731 C6	2757 B5	2780 B5	3577 B3	3740 B4	6514 A3	9518 A6	9532 B1	9545 D1	9558 C2	9571 C4	9585 C4	9598 A3	9611 B5	9624 A6	9637 D4
29 A3	1529 A5	1712 B1	2540 B4	2572 C2	2610 D2	2665 D5	2732 C6	2758 A6	3513 B4	3578 B3	3745 B6	6515 D2	9519 C5	9533 B1	9546 D1	9559 C3	9573 B2	9586 C4	9599 B4	9612 C5	9625 A2	9638 A6
30 A2	1530 A4	2511 D3	2541 D1	2573 B2	2619 C4	2666 D5	2735 C6	2762 B6	3521 B4	3582 C3	3746 B6	6516 D6	9520 A4	9534 A2	9547 D1	9560 C3	9574 C2	9587 B4	9600 B4	9613 B5	9626 A6	9639 B6
31 A3	1531 A1	2512 D3	2542 D1	2574 C2	2620 D4	2711 C6	2742 B6	2765 B6	3522 C4	3593 D4	3752 B5	6517 A4	9521 A2	9535 B2	9548 D3	9561 C3	9575 B2	9588 B3	9601 B4	9614 B2	9627 A6	9640 B4
32 B1	1532 B1	2513 B4	2546 A5	2575 C2	2621 D3	2712 C6	2743 B6	2766 C6	3530 D1	3607 D2	3767 A6	6531 B3	9523 A1	9536 B2	9549 D3	9562 C3	9576 B2	9589 B3	9602 B4	9615 C5	9628 A4	9711 B6
1501 D6	1533 B2	2514 C4	2549 C4	2576 C2	2631 D4	2713 C6	2744 B6	2767 B5	3531 B5	3608 D2	3768 A6	6711 A6	9524 A2	9537 A1	9550 B1	9563 C3	9577 B2	9590 A3	9603 B4	9616 A4	9629 A1	9712 A6
1502 D6	1534 B1	2518 C3	2550 C4	2582 C2	2632 D5	2714 C6	2745 B6	2769 B6	3532 C5	3631 C5	3769 A6	6712 A6	9525 A2	9538 B1	9551 D4	9564 C3	9578 B2	9591 B3	9604 A5	9617 B4	9630 A3	



This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.

AF6 BOARD - CIRCUIT DIAGRAM (PART 2)

32	D5
1531	B1
1532	D6
1533	D6
1534	D7
1535	D9
1536	D8
1537	C9
1538	B6
1539	E5
1541	B3
2681	D2
2682	B7
2683	E5
2685	B3
2686	B2
2687	B2
2688	C2
2689	C3
2690	D1
3691	E2
3692	E2
3693	D1
3694	D1
3695	D1
3699	E3
4611	D1
5524	B4
6531	D2
7551	C4
7552	D1
7553	E1



# : Provision.

* : For versions with digital out only.

Note : Some values may varies, see respective parts list for correct value.

1
2
3
4
5
6
7
8
9
A
B
C
D
E
DIGITAL OUT
1531
YKC21-3416
2686
10n
2687
47n
2685
100n
(CD R/W)
1541
EH-B
COAX1
COAX2
SHIELD
5524
2u2
+CD
3695
2R2
# 4611
7552
BC327-25
+5V6
3694
5K6
2690
1u
M
3693
5K6
7553
BC847B
+VCD
3691
2K2
3692
10K
D
I2C_CLK
I2C_DATA
2688
330p
2689
330p
+5V
+5V6
6531
1N4148
2681
100n
7551
M62320FP
CS0
CS1
CS2
CHIP SELECT
SCL
SDA
VDD
GND
I2C BUS TRANSCEIVER
SHIFT REG
SO
PWR RES
OUT
I/O
IN
DATA LATCHES
I/O PORT
D7
D6
D5
D4
D3
D2
D1
D0
3699
1K
MUTE_LO
AMP_ON
DPL_REQ
MUTE
AB
STANDBY
PORE
1539
FE-BT-VK-N
CDR-MG-RW
SHIELD
COAX1
COAX2
# 2683
10n
32
DIPMATE
TO VCD
1532
FE-BT-VK-N
TO CDC-99
(BASIC)
1538
FE-BT-VK-N
TO FRONT
(FOR TEXT)
1533
FE-BT-VK-N
TO CDC-99
(FOR CD TEXT)
GND_TXT
up_CLK
DQSY
SRDT
GND_COAX
SHIELD
COAX2
COAX1
OE_LATCH
PORE
GND_CD
SILD
CDSHDATA
SICL
CDSHCLK
STR
SW_INFO
+12
+CD
CD_R
CD_L
2682 *
10n
1534
FE-BT-VK-N
TO CDC-99
(FOR DIGI_OUT)
DPL_GND
DPL_DATA
DPL_CLK
DPL_V_CLK
HP_DET
SA_IN
NTC
PW_DN
I2C_DATA
I2C_CLK
+5V6
-30V
F1
F2
GND_CD
SILD
CDSHDATA
SICL
CDSHCLK
STR
SW_INFO
1536
FE-BT-VK-N
TO FRONT
(FOR DPL SETS)
1535
FE-BT-VK-N
TO FRONT
(FOR NON-DPL SET)
1537
FE-BT-VK-N
TO FRONT
(FOR VCD)

ELECTRICAL PARTS LIST - AF6 BOARD

MISCELLANEOUS

1523	482226710953	Flex Connector 7P
1525	482226720452	Cinch Socket - Aux in
1526	482226720452	Cinch Socket - Line-out
1527	482226731729	Cinch Socket - Sub-Woofer out
1528	482226710731	Flex Connector 6P
1531	482226731729	Cinch Socket - Digital out
1534	482226511553	Flex Connector 19P
1535	482226511553	Flex Connector 19P

CAPACITORS

2501	482212614585	100nF 10% 50V
2511	482212440769	4,7µF 20% 100V
2512	482212440769	4,7µF 20% 100V
2513	482212440769	4,7µF 20% 100V
2514	482212440769	4,7µF 20% 100V
2515	532212232531	100pF 5% 50V
2516	532212232531	100pF 5% 50V
2517	482212614585	100nF 10% 50V
2518	482212440433	47µF 20% 25V
2519	532212232531	100pF 5% 50V
2520	532212232531	100pF 5% 50V
2521	482212440769	4,7µF 20% 100V
2522	482212440769	4,7µF 20% 100V
2523	532212232658	22pF 5% 50V
2524	532212232658	22pF 5% 50V
2525	482212421913	1µF 20% 63V
2526	482212421913	1µF 20% 63V
2527	532212234099	470pF 10% 63V
2528	532212234099	470pF 10% 63V
2529	482212613838	100nF +80/-20% 50V
2530	482212614585	100nF 10% 50V
2531	532212232654	22nF 10% 63V
2532	482212440433	47µF 20% 25V
2533	482212440769	4,7µF 20% 100V
2534	482212440769	4,7µF 20% 100V
2535	482212232535	680pF 10% 63V
2536	482212232535	680pF 10% 63V
2537	482212613692	47pF 1% 63V
2538	482212613692	47pF 1% 63V
2539	532212232654	22nF 10% 63V
2540	482212440433	47µF 20% 25V
2541	482212421913	1µF 20% 63V
2542	482212421913	1µF 20% 63V
2543	482212233127	2,2nF 10% 63V
2544	482212233127	2,2nF 10% 63V
2545	482212613838	100nF +80/-20% 50V
2546	482212441751	47µF 20% 50V
2547	532212232448	10pF 5% 63V
2548	532212232448	10pF 5% 63V
2549	482212440769	4,7µF 20% 100V
2550	482212440769	4,7µF 20% 100V
2551	482212614585	100nF 10% 50V
2552	482212441751	47µF 20% 50V
2553	482212613486	15pF 2% 63V
2560	482212441407	0,47µF 20% 63V
2561	482212441407	0,47µF 20% 63V
2562	482212441407	0,47µF 20% 63V
2563	482212142408	220nF 5% 63V
2564	482212142408	220nF 5% 63V
2565	482212610525	8,2nF 10% 63V
2566	482212610525	8,2nF 10% 63V
2571	482212151252	470nF 5% 63V
2572	482212151252	470nF 5% 63V
2573	482212151252	470nF 5% 63V
2574	482212151252	470nF 5% 63V
2575	482212151252	470nF 5% 63V
2576	482212151252	470nF 5% 63V
2577	532212231866	6,8nF 10% 63V
2578	532212231866	6,8nF 10% 63V
2579	532212231647	1nF 10% 63V
2580	532212231647	1nF 10% 63V
2581	482212233127	2,2nF 10% 63V
2582	482212440207	100µF 20% 25V
2583	482212440207	100µF 20% 25V
2584	532212232654	22nF 10% 63V
2591	482212480144	220µF 20% 25V
2592	482212480144	220µF 20% 25V
2593	482212440433	47µF 20% 25V
2594	482212440433	47µF 20% 25V
2595	532212234099	470pF 10% 63V
2596	532212234099	470pF 10% 63V
2597	482212233575	220pF 5% 63V
2598	482212233575	220pF 5% 63V
2599	482212441751	47µF 20% 50V
2601	482212612105	33nF 5% 50V
2602	482212612105	33nF 5% 50V
2603	482212233891	3,3nF 10% 63V
2604	482212233891	3,3nF 10% 63V
2605	532212234099	470pF 10% 63V
2606	532212234099	470pF 10% 63V
2607	482212614585	100nF 10% 50V
2608	482212614585	100nF 10% 50V
2609	482212151252	470nF 5% 63V
2610	482212151252	470nF 5% 63V
2611	482212610847	1,8nF 10% 63V
2612	482212610847	1,8nF 10% 63V
2613	532212231647	1nF 10% 63V
2614	532212231647	1nF 10% 63V
2615	482212233575	220pF 5% 63V
2616	482212233575	220pF 5% 63V
2617	532212234099	470pF 10% 63V
2618	532212234099	470pF 10% 63V
2619	482212422652	2,2µF 20% 50V
2620	482212422652	2,2µF 20% 50V

ELECTRICAL PARTS LIST - AF6 BOARD

CAPACITORS

2621	482212440207	100µF 20% 25V
2623	482212613482	470nF +80/-20% 16V
2624	482212613482	470nF +80/-20% 16V
2631	482212421913	1µF 20% 63V
2632	482212421913	1µF 20% 63V
2633	532212234099	470pF 10% 63V
2634	532212234099	470pF 10% 63V
2637	482212613692	47pF 1% 63V
2638	482212613692	47pF 1% 63V
2639	532212232654	22nF 10% 63V
2640	482212440433	47µF 20% 25V
2641	482212440207	100µF 20% 25V
2647	482212481151	22µF 50V
2648	482212481151	22µF 50V
2649	532212232531	100pF 5% 50V
2650	532212232531	100pF 5% 50V
2655	482212440769	4,7µF 20% 100V
2658	482212233575	220pF 5% 63V
2661	482212421913	1µF 20% 63V
2662	532212231647	1nF 10% 63V
2663	532212232448	10pF 5% 63V
2664	482212421913	1µF 20% 63V
2666	482212440207	100µF 20% 25V
2668	532212234099	470pF 10% 63V
2669	482212613838	100nF +80/-20% 50V
2681	482212614585	100nF 10% 50V
2682	532212234098	10nF 10% 63V
2685	482212613838	100nF +80/-20% 50V
2686	482212614585	100nF 10% 50V
2687	482212613751	47nF 10% 63V
2688	532212231863	330pF 5% 63V
2689	532212231863	330pF 5% 63V
2690	482212614043	1µF +80-20% 16V
2694	482212613838	100nF +80/-20% 50V

RESISTORS

3501	482205110102	1k 2% 0,25W
3502	482211710833	10k 1% 0,1W
3511	482205120182	1k8 5% 0,1W
3512	482205120182	1k8 5% 0,1W
3513	482211683961	6k8 5%
3514	482211711507	6k8 1% 0,1W
3515	482211711507	6k8 1% 0,1W
3516	482211711507	6k8 1% 0,1W
3517	482205120332	3k3 5% 0,1W
3518	482205120332	3k3 5% 0,1W
3519	482205120333	33k 5% 0,1W
3520	482205120333	33k 5% 0,1W
3521	482211652234	100k 5% 0,5W
3522	482211652234	100k 5% 0,5W
3523	482211711149	82k 1% 0,1W
3524	482211711149	82k 1% 0,1W
3525	482205110102	1k 2% 0,25W
3526	482205110102	1k 2% 0,25W
3527	482205110102	1k 2% 0,25W
3528	482205110102	1k 2% 0,25W
3529	482211711449	2k2 1% 0,1W
3530	482211652256	2k2 5% 0,5W
3531	482211652256	2k2 5% 0,5W
3532	482211652256	2k2 5% 0,5W
3533	482211652234	100k 5% 0,5W
3534	482211652234	100k 5% 0,5W
3535	482211710837	100k 1% 0,1W
3536	482211710837	100k 1% 0,1W
3537	482205120333	33k 5% 0,1W
3538	482205120333	33k 5% 0,1W
3540	482211710833	10k 1% 0,1W
3541	482205110102	1k 2% 0,25W
3542	482205110102	1k 2% 0,25W
3543	482211711507	6k8 1% 0,1W
3544	482211711507	6k8 1% 0,1W
3545	482205120273	27k 5% 0,1W
3546	482211652264	27k 5% 0,5W
3547	482205120182	1k8 5% 0,1W
3548	482205120182	1k8 5% 0,1W
3549	482205120562	5k6 5% 0,1W
3550	482211710834	47k 1% 0,1W
3551	482205120154	150k 5% 0,1W
3552	482205120154	150k 5% 0,1W
3553	482205120334	330k 5% 0,1W
3554	482211710353	150R 1% 0,1W
3555	482205120391	390R 5% 0,1W
3556	482211711449	2k2 1% 0,1W
3557	482211711149	82k 1% 0,1W
3558	482205120225	2M2 5% 0,1W
3559	482205120225	2M2 5% 0,1W
3560	482205120475	4M7 5% 0,1W
3563	482211711449	2k2 1% 0,1W
3564	482211711449	2k2 1% 0,1W
3565	482211711449	2k2 1% 0,1W
3566	482211711449	2k2 1% 0,1W
3567	482205120223	22k 5% 0,1W
3568	482205120223	22k 5% 0,1W
3569	482205120472	4k7 5% 0,1W
3570	482205120472	4k7 5% 0,1W
3571	482205120472	4k7 5% 0,1W
3572	482205120472	4k7 5% 0,1W
3573	482205120472	4k7 5% 0,1W
3574	482205120472	4k7 5% 0,1W
3575	482211711503	220R 1% 0,1W
3576	482211711503	220R 1% 0,1W
3577	482205011002	1k 1% 0,4W
3578	482205011002	1k 1% 0,4W
3580	482205110102	1k 2% 0,25W

3581	482211711449	2k2 1% 0,1W
3582	482211652256	2k2 5% 0,5W
3583	482211711503	220R 1% 0,1W
3584	482211711503	220R 1% 0,1W
3585	482211710834	47k 1% 0,1W
3586	482211710834	47k 1% 0,1W
3587	482205120154	150k 5% 0,1W
3588	482205120154	150k 5% 0,1W
3589	482211711449	2k2 1% 0,1W
3590	482211711449	2k2 1% 0,1W
3591	482205120223	22k 5% 0,1W
3592	482205120223	22k 5% 0,1W
3593	482211683884	47k 5% 0,5W
3594	482211710834	47k 1% 0,1W
3595	482205120333	33k 5% 0,1W
3596	482211710834	47k 1% 0,1W
3597	482205120105	1M 5% 0,1W
3598	482205120475	4M7 5% 0,1W
3599	482211711148	56k 1% 0,1W
3600	482211711148	56k 1% 0,1W
3601	482205120332	3k3 5% 0,1W
3602	482205120332	3k3 5% 0,1W
3603	482205120684	680k 5% 0,1W
3604	482205120684	680k 5% 0,1W
3605	482211713579	220k 1% 0,1W
3606	482211713579	220k 1% 0,1W
3607	482205021003	10k 1% 0,6W
3608	482205021003	10k 1% 0,6W
3609	482211710833	10k 1% 0,1W
3610	482211710833	10k 1% 0,1W
3611	482205120562	5k6 5% 0,1W
3612	482205120562	5k6 5% 0,1W
3613	482205120562	5k6 5% 0,1W
3614	482205120562	5k6 5% 0,1W
3615	482205120562	5k6 5% 0,1W
3616	482205120562	5k6 5% 0,1W
3617	482205120822	8k2 5% 0,1W
3618	482205120822	8k2 5% 0,1W
3619	482205120822	8k2 5% 0,1W
3620	482205120822	8k2 5% 0,1W
3621	482205120822	8k2 5% 0,1W
3622	482205120822	8k2 5% 0,1W
3623	482211710834	47k 1% 0,1W
3624	482211710834	47k 1% 0,1W
3625	482205110102	1k 2% 0,25W
3626	482205110102	1k 2% 0,25W
3627	482211711503	220R 1% 0,1W
3628	482211711503	220R 1% 0,1W
3629	482211711454	820R 1% 0,1W
3631	482211652231	820R 5% 0,5W
3632	482211652231	820R 5% 0,5W
3633	482205120562	5k6 5% 0,1W
3634	482205120562	5k6 5% 0,1W
3635	482211710833	10k 1% 0,1W
3636	482211710833	10k 1% 0,1W
3637	482211710834	47k 1% 0,1W
3638	482211710834	47k 1% 0,1W
3639	482211711383	12k 1% 0,1W
3640	482211711383	12k 1% 0,1W
3641	482205210109	⚠ 10R 5% 0,33W
3642	482205120472	4k7 5% 0,1W
3643	482205120472	4k7 5% 0,1W
3645	482205120479	47R 5% 0,1W
3646	482205120479	47R 5% 0,1W
3647	482205120479	47R 5% 0,1W
3648	482205120479	47R 5% 0,1W
3649	482211711454	820R 1% 0,1W
3650	482211711454	820R 1% 0,1W
3651	482205120392	3k9 5% 0,1W
3652	482205120392	3k9 5% 0,1W
3655	482205021003	10k 1% 0,6W
3656	482211710833	10k 1% 0,1W
3657	482205110102	1k 2% 0,25W
3658	482205120562	5k6 5% 0,1W
3660	482205120472	4k7 5% 0,1W
3661	482205120475	4M7 5% 0,1W
3662	482205110102	1k 2% 0,25W
3663	482205110102	1k 2% 0,25W
3671	482211713579	220k 1% 0,1W
3672	482211713579	220k 1% 0,1W
3673	482211712955	2k7 1% 0,1W
3674	482205120334	330k 5% 0,1W
3675	482211711449	2k2 1% 0,1W
3676	482205120229	22R 5% 0,1W
3677	482205120471	470R 5% 0,1W
3681	482205210229	⚠ 22R 5% 0,33W
3682	482205110102	1k 2% 0,25W
3683	482205120471	470R 5% 0,1W
3684	482205120392	3k9 5% 0,1W
3691	482211711449	2k2 1% 0,1W
3692	482211710833	10k 1% 0,1W
3693	482205120562	5k6 5% 0,1W
3694	482205120562	5k6 5% 0,1W
3695	482205120228	2R2 5% 0,1W
3699	482205011002	1k 1% 0,4W
3768	482205011002	1k 1% 0,4W
4513	482205120008	0R Jumper 0805
4514	482205120008	0R Jumper 0805
4515	482205120008	0R Jumper 0805
4522	482205120008	0R Jumper 0805
4523	482205120008	0R Jumper 0805
4524	482205120008	0R Jumper 0805
4525	482205120008	0R Jumper 0805
4527	482205120008	0R Jumper 0805

ELECTRICAL PARTS LIST - AF6 BOARD

RESISTORS

4528	482205120008	0R Jumper 0805
4529	482205120008	0R Jumper 0805
4530	482205120008	0R Jumper 0805
4531	482205120008	0R Jumper 0805
4532	482205120008	0R Jumper 0805
4533	482205120008	0R Jumper 0805
4534	482205120008	0R Jumper 0805
4535	482205120008	0R Jumper 0805
4536	482205120008	0R Jumper 0805
4537	482205120008	0R Jumper 0805
4538	482205120008	0R Jumper 0805
4539	482205120008	0R Jumper 0805
4540	482205120008	0R Jumper 0805
4541	482205120008	0R Jumper 0805
4542	482205120008	0R Jumper 0805
4543	482205120008	0R Jumper 0805
4544	482205120008	0R Jumper 0805
4545	482205120008	0R Jumper 0805
4546	482205120008	0R Jumper 0805
4547	482205120008	0R Jumper 0805
4548	482205120008	0R Jumper 0805
4549	482205120008	0R Jumper 0805
4551	482205120008	0R Jumper 0805
4553	482205120008	0R Jumper 0805
4554	482205120008	0R Jumper 0805
4556	482205120008	0R Jumper 0805
4557	482205120008	0R Jumper 0805
4558	482205120008	0R Jumper 0805
4559	482205120008	0R Jumper 0805
4561	482205120008	0R Jumper 0805
4562	482205120008	0R Jumper 0805
4563	482205120008	0R Jumper 0805
4565	482205120008	0R Jumper 0805
4566	482205120008	0R Jumper 0805
4567	482205120008	0R Jumper 0805
4571	482205120008	0R Jumper 0805
4573	482205120008	0R Jumper 0805
4580	482205120008	0R Jumper 0805
4712	482205120008	0R Jumper 0805
4714	482205120008	0R Jumper 0805
4715	482205120008	0R Jumper 0805
4716	482205120008	0R Jumper 0805

COILS & FILTERS

5511	482215762552	Coil 2,2µH 5%
5524	482215710586	Coil 2,2µH 10%

DIODES

6511	933887190673	DIO REG BZX55-F9V1
6512	933887190673	DIO REG BZX55-F9V1
6513	482213031878	1N4003G
6515	482213030621	1N4148
6516	482213030621	1N4148
6531	482213030621	1N4148

TRANSISTOR & INTEGRATED CIRCUITS

7511	482220933652	TEA6321T/V1
7512	482220983357	NJM4560M
7513	482220983357	NJM4560M
7515	482220931378	NJM4556AM
7521	482213060511	BC847B
7522	482213060511	BC847B
7523	482213060511	BC847B
7524	482213060511	BC847B
7525	482213040959	BC547B
7526	482213060373	BC856B
7527	482213060511	BC847B
7528	482213060511	BC847B
7529	482213060373	BC856B
7531	482213060511	BC847B
7532	482213060511	BC847B
7533	482213060511	BC847B
7534	482213060511	BC847B
7535	482213042804	BC817-25
7536	482213042804	BC817-25
7537	482213060511	BC847B
7538	482213060511	BC847B
7539	482213060373	BC856B
7541	482213060511	BC847B
7543	482213042804	BC817-25
7551	482220917345	M62320FP
7552	482213041246	BC327-25
7553	482213060511	BC847B

Note : Only the parts mentioned in this list are normal service spare parts.

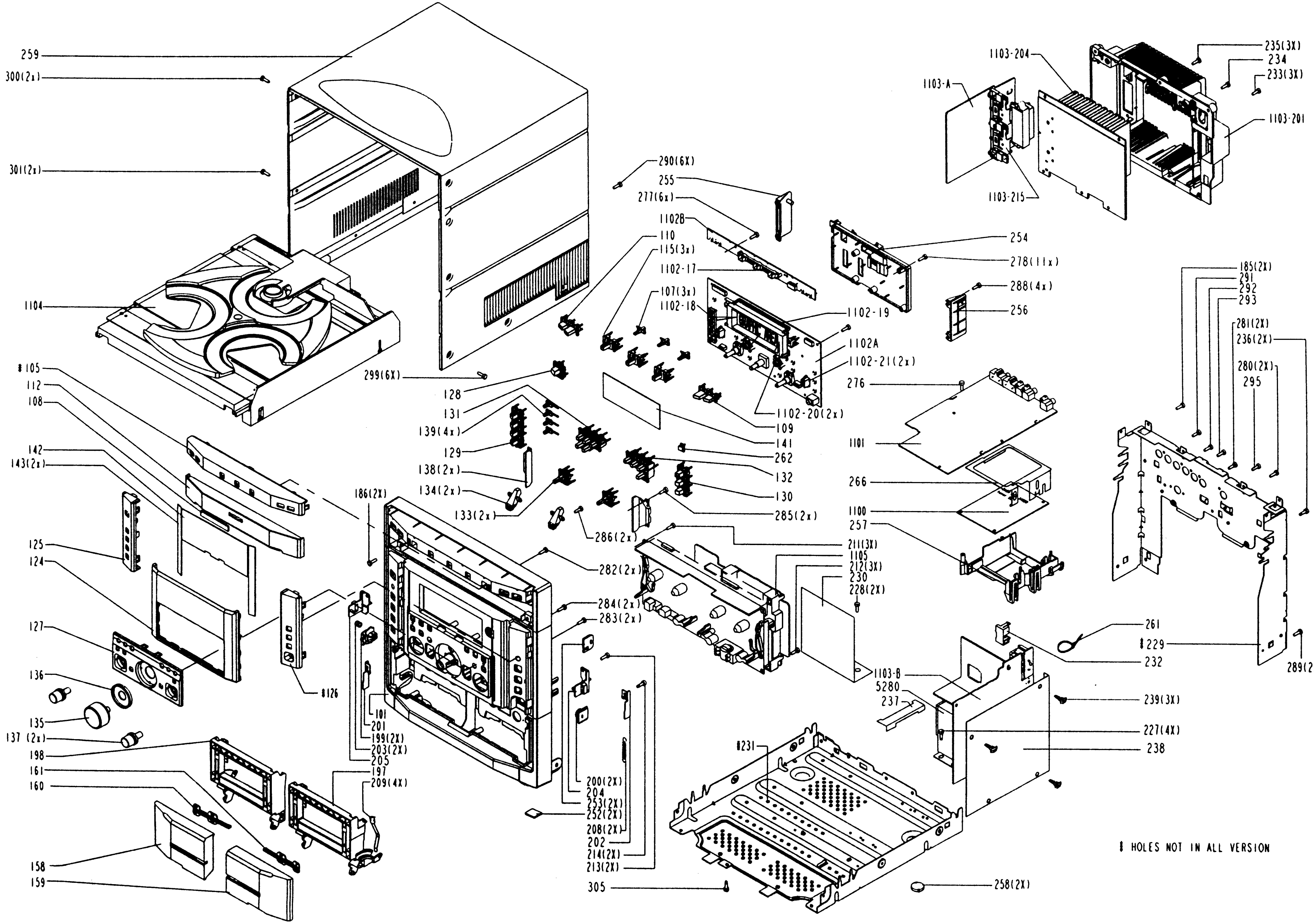
MECHANICAL & ACCESSORIES PARTS LIST - MAIN UNIT

0101	3139 117 88160	Cabinet Front
0105	3139 117 88170	Panel Front CDC /22
0105	3139 117 89110	Panel Front CDC Non RDS /37
0108	4822 454 13408	Badge-Philips Assembly
0109	3139 117 88270	Button Set Open/Close
0110	3139 117 88250	Button Set NEWS/RDS /22
0112	3139 117 88220	Cover Tray CDC
0115	3139 117 88260	Button CDC Select
0124	3139 117 88210	Lens Window Display
0125	3139 117 88180	Panel Front Display Left
0126	3139 117 89190	Panel Front Display Right
0127	3139 117 88200	Panel Front Display Center
0128	3139 117 88280	Button Standby/On
0129	3139 117 88290	Button Set Source
0130	3139 117 89180	Button Set Clock/Timer
0131	3139 117 88310	Button Set Control
0132	3139 117 88320	Button Set Record
0133	3139 117 88330	Button IS/Loudness
0135	3139 117 88340	Knob Volume
0136	3139 117 89030	Ring Knob Volume Foiled
0137	3139 117 88350	Knob Bass/Treble
0158	3139 117 88230	Cover Cassette Left
0159	3139 117 88240	Cover Cassette Right
0160	3139 114 67090	Lens Cassette Right
0161	3139 114 67080	Lens Cassette Left
0197	4822 443 10488	Door Cassette Right
0198	4822 443 10487	Door Cassette Left
0199	4822 402 10621	Push-Catch
0200	4822 529 10322	Damper Assembly
0203	4822 492 11344	Spring Compression
0204	4822 402 11246	Bracket-Right
0205	4822 402 11245	Bracket-Left
0208	4822 492 11345	Spring Tension
0209	4822 492 42787	Spring Cassette
0232	4822 402 10288	Bracket Mains Socket
0239	4822 466 93148	Spacer 5mm
0252	4822 462 40683	Foot Rubber (SQ)
0254	3139 114 67340	Plate Front
0258	4822 462 40683	Plate (Foot)
0259	4822 426 10807	Cabinet Rear
0350	3139 118 77060	L/R Loudspeaker Box /22
0350	3139 118 77050	L/R Loudspeaker Box /37
0351	4822 303 50063	FM Aerial
0356	3139 118 77040	Remote Control
0384	4822 303 50082	AM Frame Aerial
0385	4822 321 10249	△ Mains Cord /22
0385	4822 321 11466	△ Mains Cord /37
0387	3139 116 19160	Instruction For Use /22
0387	3139 116 19200	Instruction For Use /37
1571	3139 110 34330	Cable Foil 06P/180/06P BD
1573	4822 320 12654	Flex Cable AD 07P 220mm
1653	4822 320 12655	Flex Cable BD 07P 120mm
1680	3139 110 34260	Cable Foil 10P/280/10P AD
1681	4822 320 12657	Flex Cable BD 19P 560mm
5280	4822 146 10728	△ Mains Transformer /22
5280	4822 146 11129	△ Mains Transformer /37

Note : Only the parts mentioned in this list are normal service spare parts.

SCREW LISTS - MAIN UNIT

185	D3 x 10
186	D3 x 10
211	D3 x 10
212	D3 x 10
213	D3 x 10
214	D3 x 10
227	M3 x 6
228	M3 x 6
233	M3 x 10
234	D3 x 12
235	M3 x 10
236	M3 x 10
276	D3 x 12
277	D3 x 10
278	D3 x 10
280	D3 x 10
281	D3 x 10
282	D3 x 10
283	D3 x 10
284	D3 x 10
285	D2 x 8
286	D2 x 8
288	D3 x 10
289	M3 x 10
290	M3 x 10
291	D3 x 12
292	D3 x 12
293	D3 x 12
295	D3 x 12
299	M3 x 10
300	M3 x 12
301	M3 x 10
305	M3 x 6


259
300(2x)
301(2x)
1104
‡105
112
108
142
143(2x)
125
124
127
136
135
137 (2x)
198
161
160
158
159
290(6X)
255
277(6x)
1102B
110
115(3x)
1102-17
107(3x)
1102-18
1102-19
1102A
1102-21(2x)
1102-20(2x)
109
141
262
132
130
285(2x)
299(6X)
128
131
139(4x)
129
138(2x)
134(2x)
133(2x)
286(2x)
186(2X)
‡126
101
201
199(2X)
203(2X)
205
197
209(4X)
282(2x)
284(2x)
283(2x)
211(3X)
1105
212(3X)
230
228(2X)
200(2X)
204
253(2X)
252(2X)
208(2X)
202
214(2X)
213(2X)
305
1103-204
1103-A
1103-215
1103-201
235(3X)
234
233(3X)
254
278(11x)
288(4x)
256
276
1101
266
1100
257
185(2X)
291
292
293
281(2X)
236(2X)
280(2X)
295
261
‡229
232
289(2X)
1103-B
5280
237
239(3X)
227(4X)
238
‡231
258(2X)
‡ HOLES NOT IN ALL VERSION